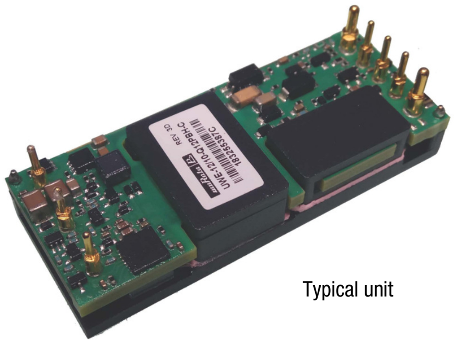
UWE-Q12 Series

Eighth-Brick DOSA-Compatible
Wide Input Isolated DC-DC Converters



Typical unit

Output Voltage (V)	Output Current (A)	Input Voltage (V)
5	24	9-36
12	10	9-36
24	5	9-36

FEATURES

- High efficiency @ 12Vout, 92%
- Up to 120 Watts total output power
- DOSA 1/8 brick pinout
- Over Temperature Protection (OTP)
- Over Current Protection (OCP)
- Over Voltage Protection (OVP)
- 2250Vdc I/O insulation
- Operating temperature range -40 to 85°C (with derating)
- Pre-bias startup support

SAFETY FEATURES

- Basic I/O insulation
- UL 60950-1, 2nd edition
- CAN/CSA – C22.2 NO.60950-1
- UL 62368-1 approved
- RoHS compliant

PRODUCT OVERVIEW

The UWE-Q12 series open frame DC-DC converters deliver up to 120 Watts in an industry-standard “eighth-brick” through-hole package with a Vin range of 9-36Vdc. Standard fixed-output voltages include 5Vdc, 12Vdc and 24Vdc.

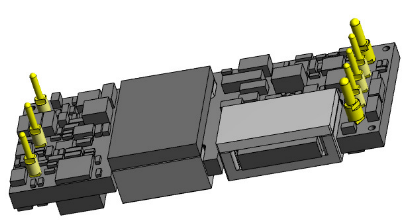
The extended 4-to-1 input voltage range is ideal for applications that require a battery back-up, telecom or portable applications. The modules can be configured with an optional baseplate for cooling in the most demanding applications.

The synchronous rectifier design uses the maximum available duty cycle for greatest efficiency and low power dissipation. These devices deliver low output noise, tight line/load regulation, stable no-load operation and fast load step response. The modules are designed to meet 2,250Vdc I/O isolation with a basic insulation system for the greatest application flexibility. On-board Sense terminals compensate for load line voltage errors at high output currents and Outputs can be trimmed within +10%, -20% of nominal voltage.

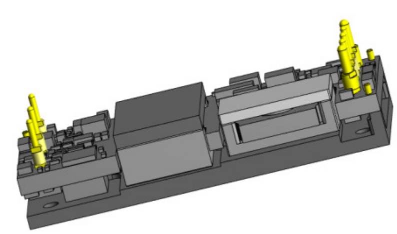
A wealth of protection features prevents damage to both the converter and outside circuits. Inputs are protected from under voltage and outputs feature short circuit protection, over current and over temperature shut down. Overloads automatically recover using the “hiccup” technique upon fault removal. The UWE-Q12 is certified to standard safety and EMI/RFI approvals. All units meet RoHS-6 hazardous materials compliance.

All units are precision assembled in a highly automated facility with ISO-traceable manufacturing quality standards.

Open Frame



With Baseplate



For details go to
www.murata-ps.com/rohs

PERFORMANCE SPECIFICATIONS SUMMARY AND ORDERING GUIDE ① ②

Root Model ①	Output							Input				Efficiency		Open-Frame Package (inches) ④
	Vout (V)	Iout (A, max.)	Power (W)	R/N (mV pk-pk)		Regulation (max.) ③		Vin Nom. (V)	Range (V)	Iin, no load (mA)	Iin, full load (A)			
				Typ.	Max.	Line	Load					Min.	Typ.	
UWE-5/24-Q12	5	24	120	100	150	±0.4%	±0.4%	12	9-36	250	14.96	90%	92%	2.30 x 0.9 x 0.4
UWE-12/10-Q12	12	10	120	115	200	±0.3%	±0.3%	12	9-36	400	14.96	90%	92%	2.30 x 0.9 x 0.4
UWE-24/5-Q12	24	5	120	150	240	±0.4%	±0.4%	12	9-36	80	14.96	90%	92%	2.30 x 0.9 x 0.4

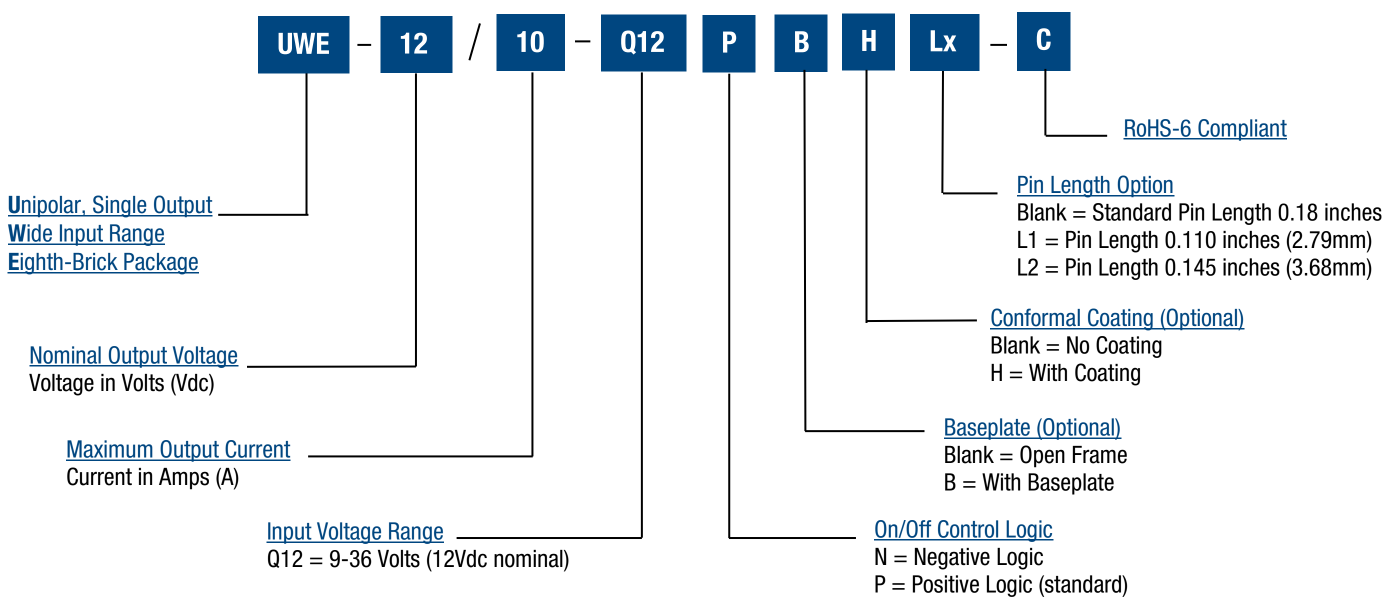
① Please refer to the Part Number Structure when ordering.

② All specifications are at nominal line voltage and full load, +25°C unless otherwise noted. See detailed specifications. Output capacitors are 1µF ceramic multilayer in parallel with 10µF and minimum requested output capacitors. I/O caps are necessary for our test equipment and may not be needed for your application.

③ Regulation specifications describe output voltage deviations from a nominal/midpoint value to either extreme (50% load step).

④ Please see the Mechanical Specifications for details regarding the open-frame and baseplate package.

PART NUMBER STRUCTURE



Part Number Examples:

UWE-12/10-Q12PB-C stands for unipolar, single-output, wide input range, 1/8 Brick, 12Vout @ 10A, 9V-36Vin, Positive Logic, with Baseplate, Standard Pin Length, RoHS-6 Compliant.

UWE-24/5-Q12NL2-C stands for unipolar, single-output, wide input range, 1/8 Brick, 24Vout @ 5A, 9V-36Vin, Negative Logic, Open Frame, Pin Length 0.145 inches, RoHS-6 Compliant.

NOTE: Please see the Product Status table on Page 32.

FUNCTIONAL SPECIFICATIONS, UWE-5/24-Q12

ABSOLUTE MAXIMUM RATINGS	Notes and Conditions	Min.	Typ.	Max.	Units
Input Voltage					
Operating	Continuous	9		36	Vdc
Transient Operating	100mS			50	Vdc
Operating Ambient Temperature		-40		85	°C
Storage Temperature		-45		125	°C
Input/Output Isolation Voltage				2250	Vdc
Voltage at ON/OFF input pin		-2		18	Vdc
INPUT CHARACTERISTICS					
Operating Input Voltage Range		9	12	36	Vdc
Input Under-Voltage Lockout					
Turn-On Voltage Threshold		8.1	8.5	8.95	Vdc
Turn-Off Voltage Threshold		7.8	8.4	8.8	Vdc
Lockout Voltage Hysteresis			0.4	1.0	Vdc
Reverse Polarity Protection			NA		
Maximum Input Current	Full Load, Vin=9V			14.96	A
No-Load Input Current	Vin=12V		250	400	mA
Disabled Input Current (Option N)	Vin=12V		15	20	mA
Disabled Input Current (Option P)	Vin=12V		15	20	mA
Recommended Input Fuse	Fast acting external fuse recommended			20	A
Recommended External Input Capacitance			220		μF
Inrush Current (I^2t)			0.1	0.2	A^2S
OUTPUT CHARACTERISTICS					
Total Output Power	See Derating		120	120	W
Output Voltage Set Point	Vin=Nominal, Io=0A, Ta=25°C	4.95	5.00	5.05	Vdc
Output Voltage Regulation					
Over Load	Vin=12V, Iout from Min to Max		±0.2	±0.4	%
Over Line	Iout=Full load, Vin from Min to Max. Note 2		±0.2	±0.4	%
Over Temperature	Vin=12V, Ta=-40°C to 85°C		NA		mV
Total Output Voltage Range	Over sample, line, load, temperature & life	4.95		5.05	Vdc
Output Voltage Ripple and Noise	20MHz bandwidth				
Peak-to-Peak	Full Load, 1μF ceramic, 10μF tantalum & 330μF E-Cap		100	150	mVp-p
Peak-to-Peak	All conditions, 1μF ceramic, 10μF tantalum & 330μF E-Cap			150	mVp-p
Operating Output Current Range		0		24	A
Output DC Current-Limit Inception	Output Voltage 10% Low	26	30	36	A
Output Capacitance	Nominal Vout at full load	330		4700	μF
EFFICIENCY					
100% Load	Vin=Nominal	90	92		%
50% Load	Vin=Nominal	91	93		%
100% Load	All Conditions	88			%

FUNCTIONAL SPECIFICATIONS, UWE-5/24-Q12

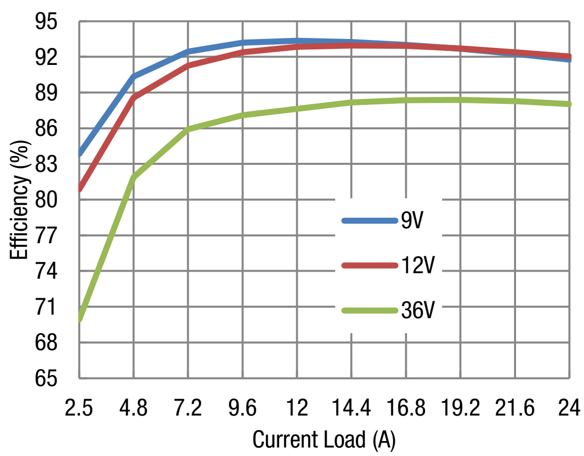
DYNAMIC CHARACTERISTICS					
Output Voltage During Load Current Transient					
Step Change	50% to 75% to 50% Iout max, 1µF+10µF+330µF load cap, 1A/µS			±300	mV
Settle Time	To within 1% Vout nom			100	µS
Turn-On Transient					
Start-up Time, From ON/OFF Control	To Vout=90% nominal		30	60	mS
Start-up Time, From Input	To Vout=90% nominal		30	60	mS
Rise Time	Time from 10% to 90% of nominal output voltage		20	40	mS
Output Voltage Overshoot				2	%
ISOLATION CHARACTERISTICS					
Insulation Safety Rating			Basic		
Input to Output			2250		Vdc
Input to Baseplate			1500		Vdc
Output to Baseplate			1500		Vdc
Isolation Resistance	Input/Output		30		MΩ
Isolation Capacitance	Input/Output		1000		pF
TEMPERATURE LIMITS FOR POWER DERATING CURVES					
Semiconductor Junction Temperature				Tjmax-25	°C
Board Temperature	UL rated max operating temp 130°C			130	°C
Transformer/Inductor Temperature				130	°C
FEATURE CHARACTERISTICS					
Switching Frequency	See from Input Terminals		240		kHz
ON/OFF Control (Option P)					
Off-State Voltage		-0.1		0.8	V
On-State Voltage	Open the ON/OFF pin = ON	2.5		18	V
ON/OFF Control (Option N)					
Off-State Voltage	Open the ON/OFF pin = OFF	2.5		18	V
On-State Voltage		-0.1		0.8	V
ON/OFF Control Current (Either Option)					
Current thru ON/OFF pin	Von/off=0V			1	mA
Current thru ON/OFF pin	Von/off=15V			50	µA
Remote Sense Compensation				10	%
Output Voltage Trim Range	Pout<=Max rated power	-20		10	%
Trim Up Equations	Please see TRIM functions technical notes				
Trim Down Equations	Please see TRIM functions technical notes				
Output Over-Voltage Protection	Hiccup mode; over full temp range; % of nominal Vout	120	140	170	%
Over-Temperature Shutdown					
Without Baseplate		115	125	130	°C
With Baseplate		115	125	130	°C

FUNCTIONAL SPECIFICATIONS, UWE-5/24-Q12

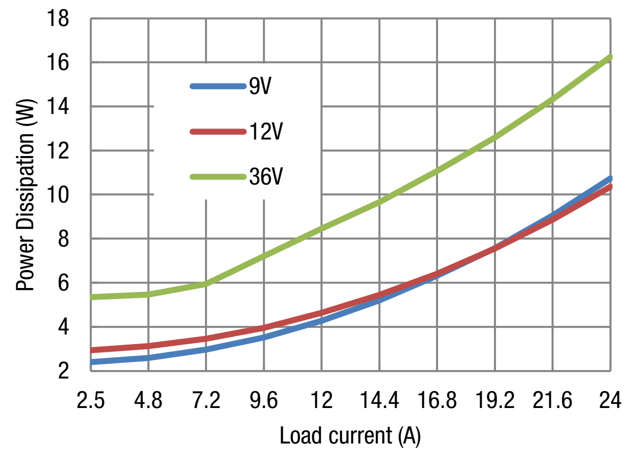
MECHANICAL SPECIFICATIONS					
Outline Dimensions – W/O Baseplate	(LxWxH)		2.30 x 0.90 x 0.40		Inches
			58.4 x 22.9 x 10.2		mm
Weight – Without Baseplate			0.88		Ounces
			25		Grams
Outline Dimensions – With Baseplate	(LxWxH)		2.30 x 0.90 x 0.52		Inches
			58.4 x 22.9 x 13.2		mm
Weight – With Baseplate			1.30		Ounces
			37		Grams
Through Hole Pin Diameter			0.060 & 0.040		Inches
			1.52 & 1.02		mm
Through Hole Pin Material			Copper alloy		
TH Pin Plating Metal and Thickness	Nickel subplate		50		μ-inches
	Gold overplate		5		μ-inches
Baseplate Material			Aluminum		
RELIABILITY/SAFETY/ENVIRONMENTAL					
Safety	Certified to UL 60950-1, CSA-C22.2 No.60950-1, IEC 60950-1, 2nd Edition		YES		
Calculated MTBF	Belcore, Telcordia SR-332, Issue 3, Method 1, Case 1, Gf		7.5		MHrs
Conducted Emissions	External filter is required, see technical notes		EN55022/CISPR22 CLASS B		
RoHS Rating			RoHS-6		

TYPICAL PERFORMANCE DATA, UWE-5/24-Q12

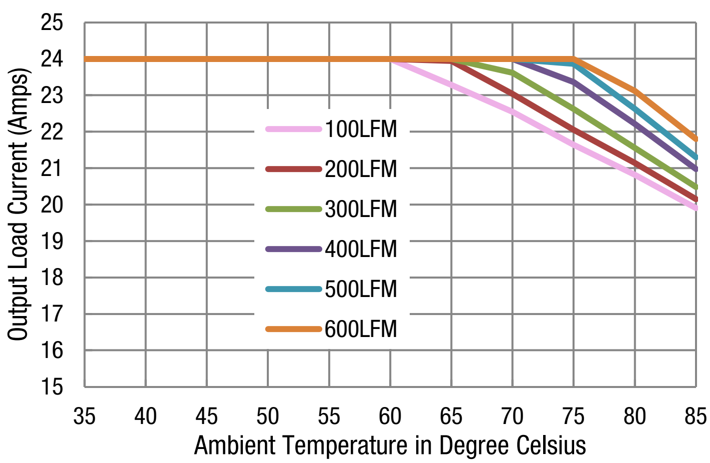
Efficiciency VS. Line Voltage and Load Current @25°C



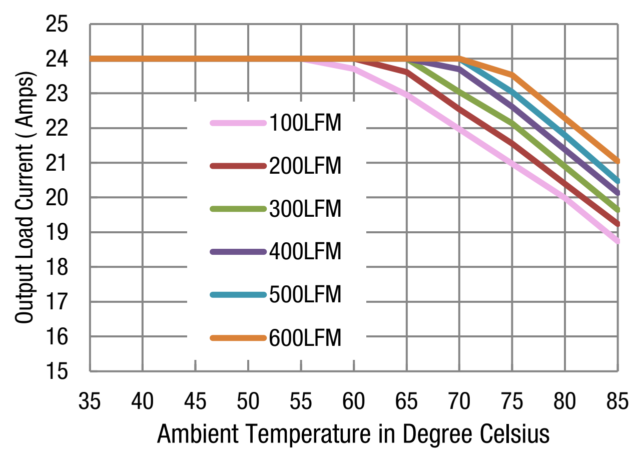
Power Dissipation vs. Load Current @ 25°C



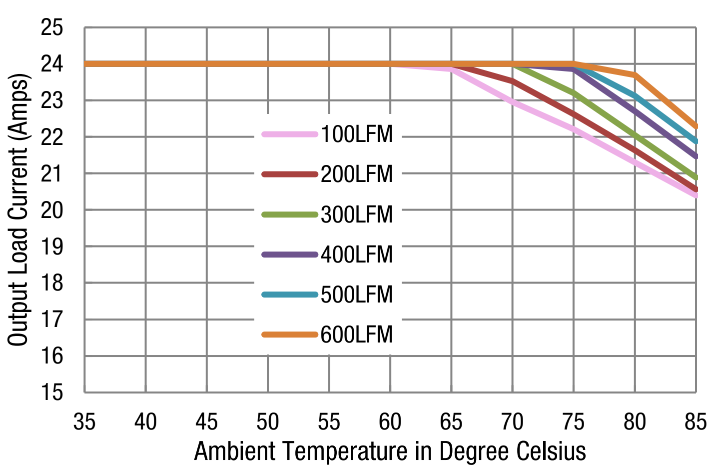
Maximum Current Temperature Derating (Open Frame)
(Vin = 9V airflow is from Vin- to Vin+)



Maximum Current Temperature Derating (Open Frame)
(Vin = 9V airflow is from Vin to Vout)



Maximum Current Temperature Derating (Open Frame)
(Vin = 12V airflow is from Vin- to Vin+)



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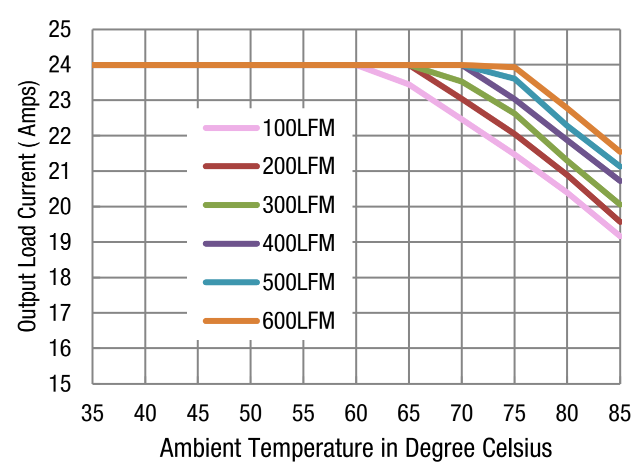
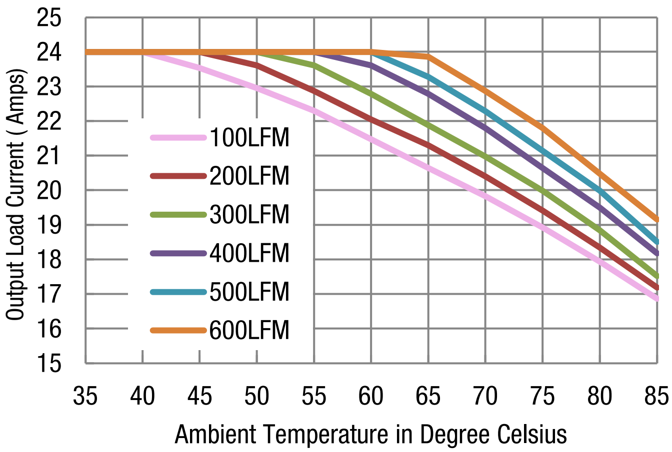


TYPICAL PERFORMANCE DATA, UWE-5/24-Q12

Maximum Current Temperature Derating (Open Frame)
(Vin = 24V airflow is from Vin- to Vin+)



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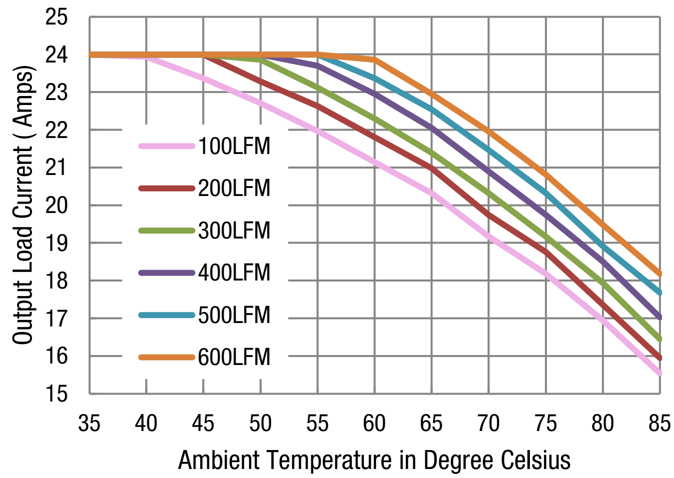
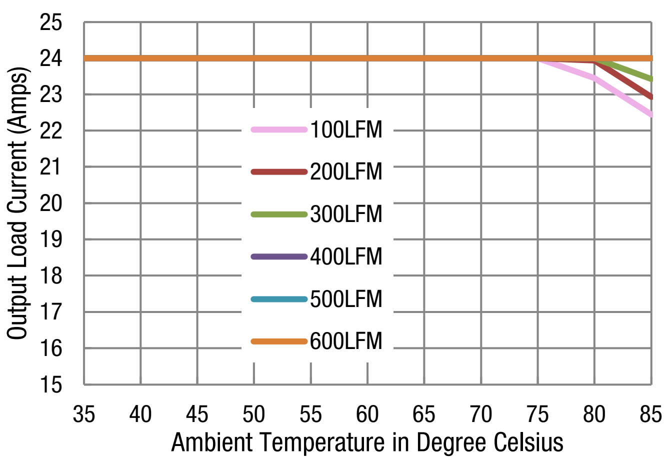
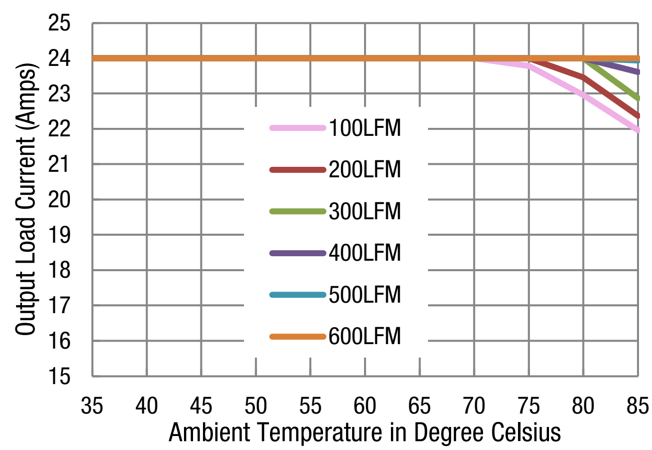
(Vin = 24V airflow is from Vin to Vout)



Maximum Current Temperature Derating (With Baseplate)
(Vin = 9V airflow is from Vin- to Vin+)



Maximum Current Temperature Derating (With Baseplate)
(Vin = 9V airflow is from Vin to Vout)



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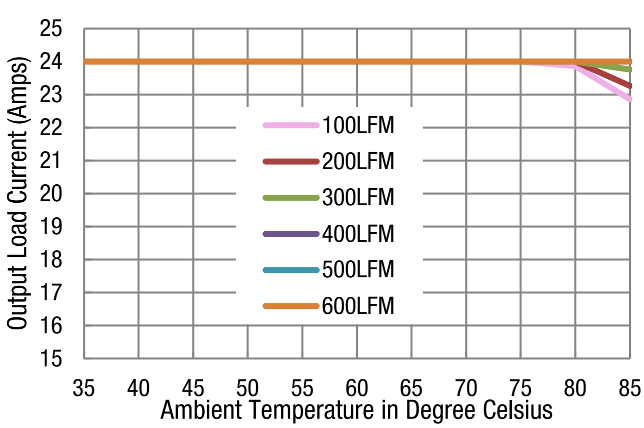
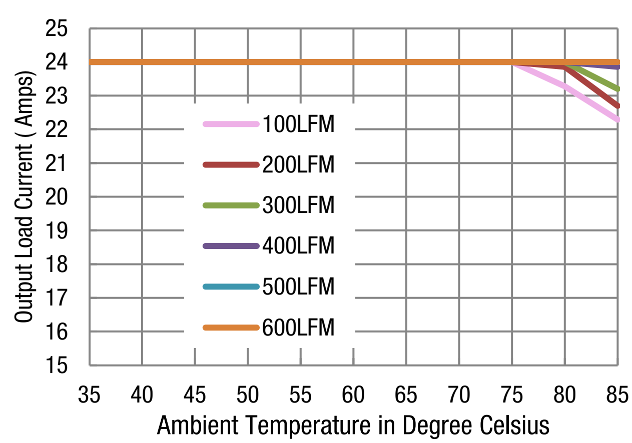
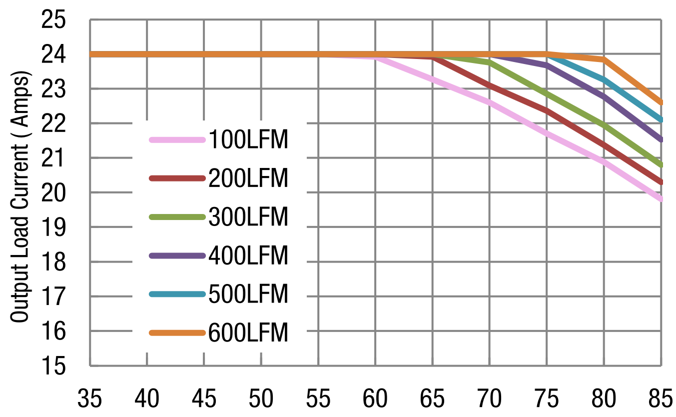


Maximum Current Temperature Derating (With Baseplate)
(Vin = 12V airflow is from Vin to Vout)

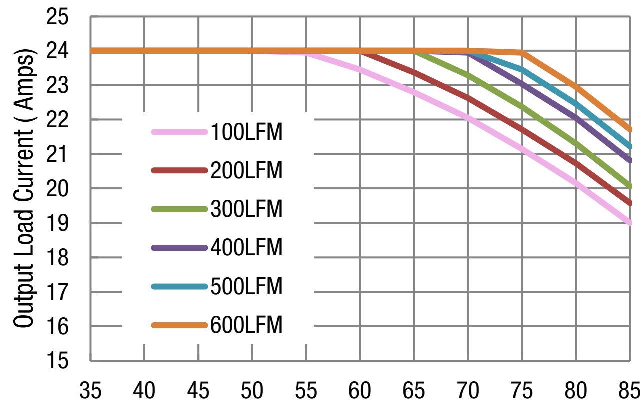


TYPICAL PERFORMANCE DATA, UWE-5/24-Q12

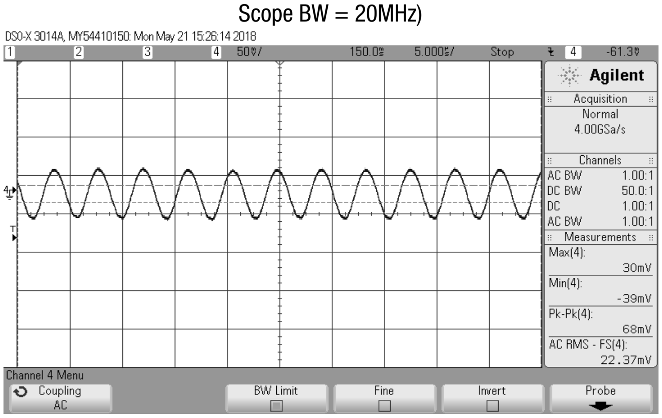
Maximum Current Temperature Derating (With Baseplate)
(Vin = 24V airflow is from Vin- to Vin+)



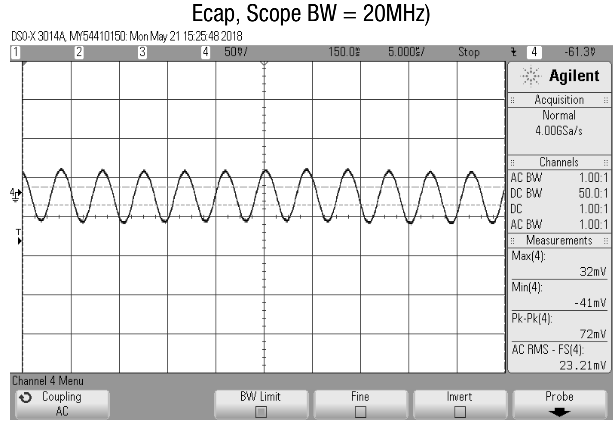
Maximum Current Temperature Derating (With Baseplate)
(Vin = 24V airflow is from Vin to Vout)



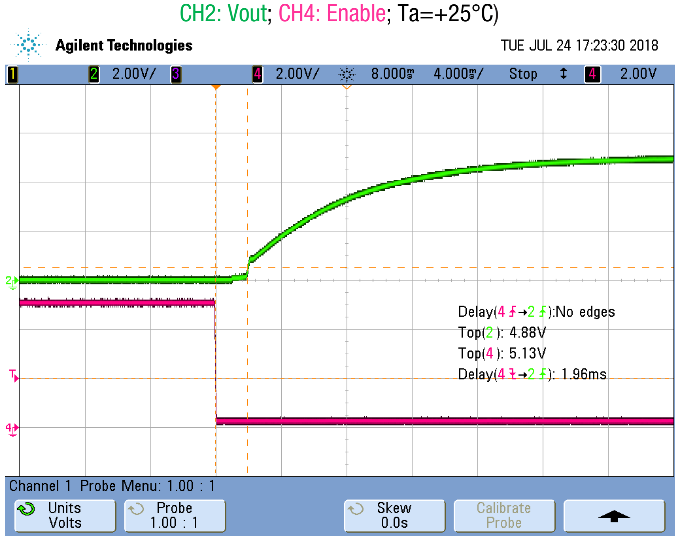
Output Ripple and Noise
(Vin =12V Iout=0A Ta=25°C Cload=1μF ceramic||10μF tantalum|| 330μF Ecap, Scope BW = 20MHz)



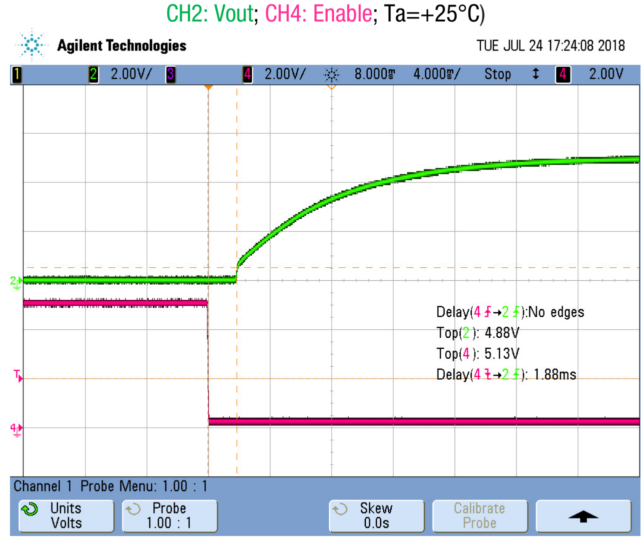
Output Ripple and Noise
(Vin =12V Iout=24A Ta=25°C Cload=1μF ceramic||10μF tantalum|| 330μF Ecap, Scope BW = 20MHz)



On/Off Enable Delay (Vin = 12V Vout= nom Iload =0A Cload=330μF
CH2: Vout; CH4: Enable; Ta=+25°C)

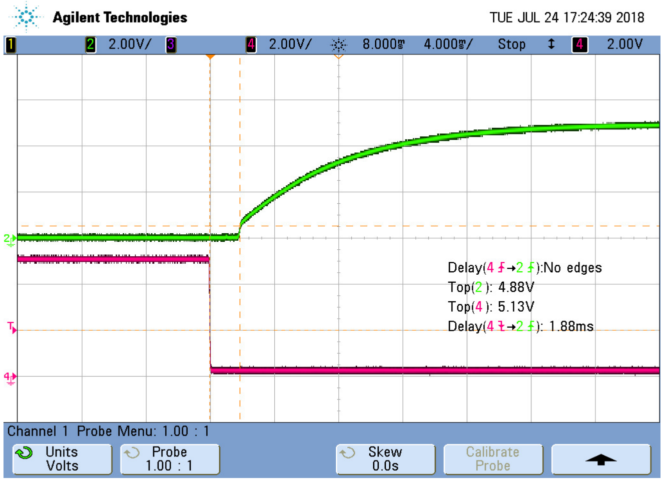


On/Off Enable Delay (Vin = 12V Vout= nom Iload =0A Cload=4700μF
CH2: Vout; CH4: Enable; Ta=+25°C)

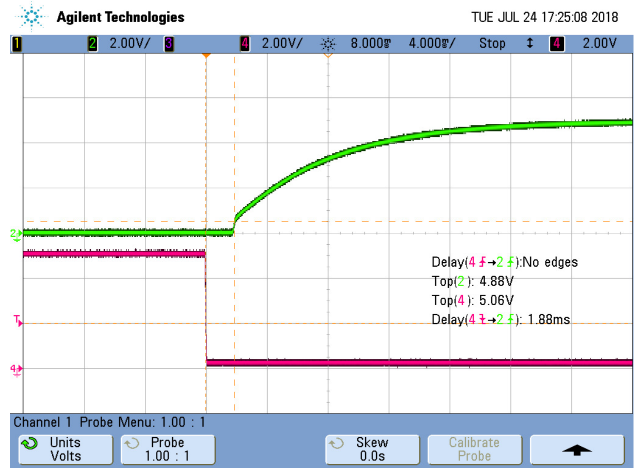


TYPICAL PERFORMANCE DATA, UWE-5/24-Q12

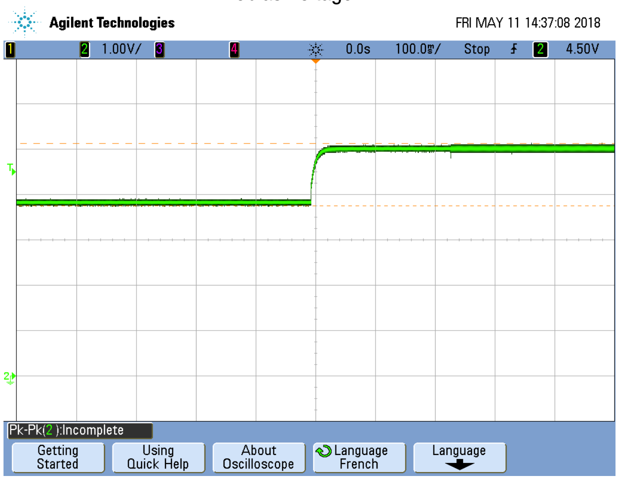
On/Off Enable Delay (Vin = 12V Vout= nom Iload =24A Cload=330µF
CH2: Vout; CH4: Enable; Ta=+25°C)



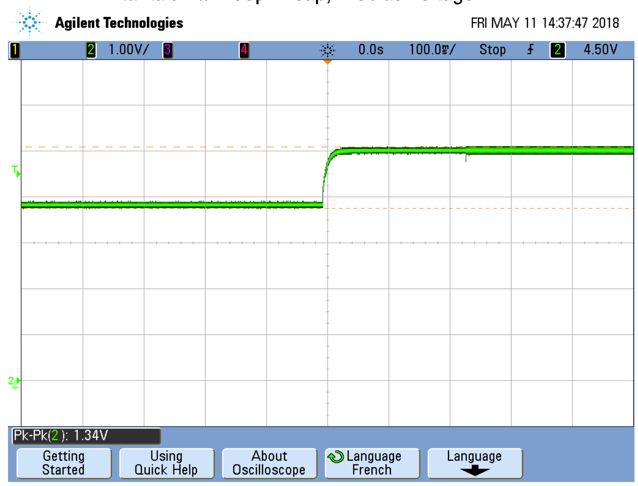
On/Off Enable Delay (Vin = 12V Vout= nom Iload =24A Cload=4700µF
CH2: Vout; CH4: Enable; Ta=+25°C)



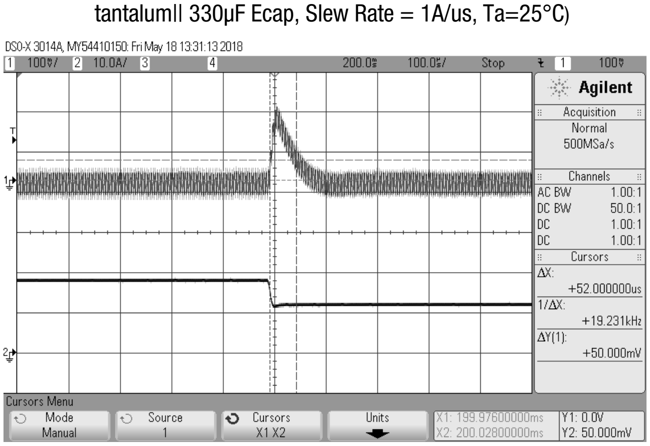
Ta = 25°C Vin = 12V Iload = 0A Cload=1µF ceramic||10µF tantalum||330µF Ecap, Prebias Voltage = 4V



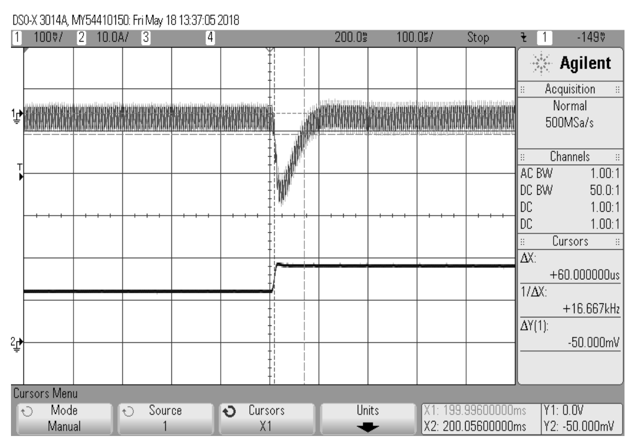
Ta = 25°C Vin = 12V Iload = 0A Cload=1µF ceramic||10µF tantalum||4700µF Ecap, Prebias Voltage = 4V



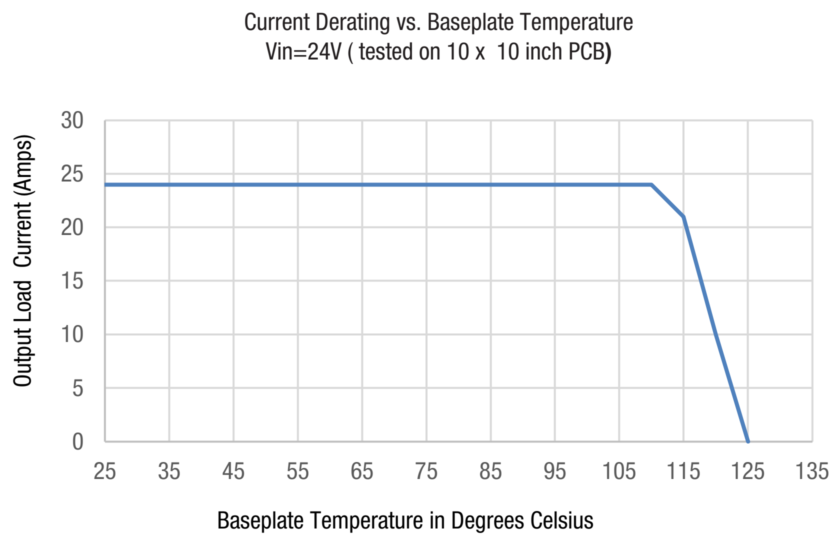
Step Load Transient Response
(Vin = 12V Vout= Nom, Iout=50-75% Step of Full load,Cload=1µF ceramic||10µF tantalum|| 330µF Ecap, Slew Rate = 1A/us, Ta=25°C)



Step Load Transient Response
(Vin = 12V Vout= Nom, Iout=50-75% Step of Full load,Cload=1µF ceramic||10µF tantalum|| 330µF Ecap, Slew Rate = 1A/us, Ta=25°C)



TYPICAL PERFORMANCE DATA, UWE-5/24-Q12



FUNCTIONAL SPECIFICATIONS, UWE-12/10-Q12

ABSOLUTE MAXIMUM RATINGS	Notes and Conditions	Min.	Typ.	Max.	Units
Input Voltage					
Operating	Continuous	9		36	Vdc
Transient Operating	100mS			50	Vdc
Operating Ambient Temperature		-40		85	°C
Storage Temperature		-55		125	°C
Input/Output Isolation Voltage				2250	Vdc
Voltage at ON/OFF input pin		-2		18	Vdc
INPUT CHARACTERISTICS					
Operating Input Voltage Range		9	12	36	Vdc
Input Under-Voltage Lockout					
Turn-On Voltage Threshold		8.1	8.5	8.95	Vdc
Turn-Off Voltage Threshold		7.8	8.4	8.8	Vdc
Lockout Voltage Hysteresis			0.4	1.0	Vdc
Reverse Polarity Protection			NA		
Maximum Input Current	Full Load, Vin=9V		14.49	14.96	A
No-Load Input Current	Vin=12V		400	600	mA
Disabled Input Current (Option N)			8	15	mA
Disabled Input Current (Option P)			8	15	mA
Recommended Input Fuse	Fast acting external fuse recommended			20	A
Recommended External Input Capacitance			33		μF
Inrush Current (I^2t)			0.1	0.2	A^2S
OUTPUT CHARACTERISTICS					
Total Output Power	See Derating	0	120	121.2	W
Output Voltage Set Point	Vin=Nominal, Io=5A, Ta=25°C	11.88	12.00	12.12	Vdc
Output Voltage Regulation					
Over Load	Vin=12V, Iout from Min to Max		±0.15	±0.3	%
Over Line	Iout=Full load, Vin from Min to Max. Note 2		±0.15	±0.3	%
Over Temperature	Vin=12V, Ta=-40°C to 85°C		NA		mV
Total Output Voltage Range	Over sample, line, load, temperature & life	11.88		12.12	Vdc
Output Voltage Ripple and Noise	20MHz bandwidth				
Peak-to-Peak	Full Load, 1μF ceramic, 10μF tantalum		115	200	mVp-p
Peak-to-Peak	All conditions, 1μF ceramic, 10μF tantalum			200	mVp-p
Operating Output Current Range		0		10	A
Output DC Current-Limit Inception	Output Voltage 10% Low	11	14.5	18.2	A
Output Capacitance	Nominal Vout at full load	0		4700	μF

FUNCTIONAL SPECIFICATIONS, UWE-12/10-Q12

EFFICIENCY					
100% Load	Vin=Nominal; Details see Figures	90	92		%
50% Load	Vin=Nominal; Details see Figures		NA		%
100% Load	All Conditions	88			%
DYNAMIC CHARACTERISTICS					
Output Voltage During Load Current Transient					
Step Change	50% to 75% to 50% Iout max, 1μF+10μF load cap, 1A/μS		±200	±300	mV
Settle Time	To within 1% Vout nom		100	150	μS
Turn-On Transient					
Start-up Time, From ON/OFF Control	To Vout=90% nominal		30	60	mS
Start-up Time, From Input	To Vout=90% nominal		30	60	mS
Start-up Delay, From ON/OFF Control	To Vout=10% nominal		25	40	mS
Start-up Delay, From Input	To Vout=10% nominal		25	40	mS
Rise Time	Time from 10% to 90% of nominal output voltage		25	60	mS
Output Voltage Overshoot				2	%
ISOLATION CHARACTERISTICS					
Insulation Safety Rating			Basic		
Input to Output			2250		Vdc
Input to Baseplate			1500		Vdc
Output to Baseplate			1500		Vdc
Isolation Resistance	Input/Output		10		MΩ
Isolation Capacitance	Input/Output		1000		pF
TEMPERATURE LIMITS FOR POWER DERATING CURVES					
Semiconductor Junction Temperature				Tjmax-25	°C
Board Temperature	UL rated max operating temp 130°C			130	°C
Transformer/Inductor Temperature				130	°C
FEATURE CHARACTERISTICS					
Switching Frequency	See from Input Terminals		220		kHz
ON/OFF Control (Option P)					
Off-State Voltage		-0.1		0.8	V
On-State Voltage	Open the ON/OFF pin = ON	2.5		18	V
ON/OFF Control (Option N)					
Off-State Voltage	Open the ON/OFF pin = OFF	2.5		18	V
On-State Voltage		-0.1		0.8	V
ON/OFF Control Current (Either Option)					
Current thru ON/OFF pin	Von/off=0V			1	mA
Current thru ON/OFF pin	Von/off=15V			50	μA

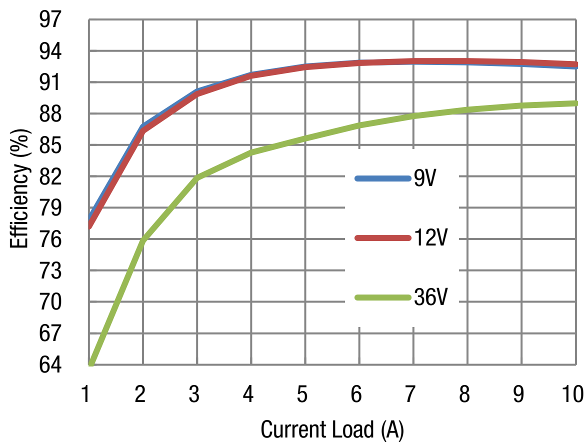
Murata Power Solutions

FUNCTIONAL SPECIFICATIONS, UWE-12/10-Q12

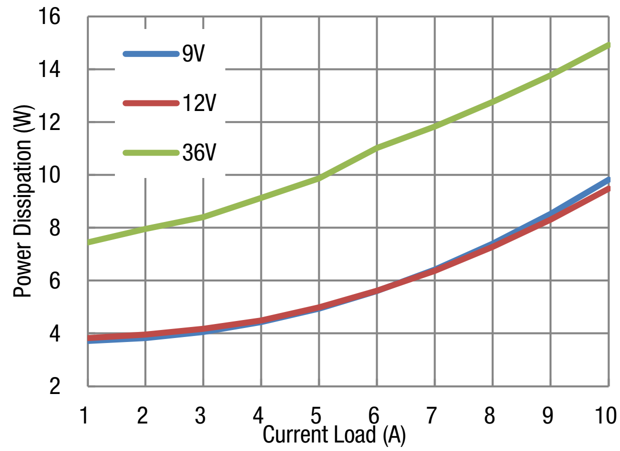
FEATURE CHARACTERISTICS					
Remote Sense Compensation			10		%
Output Voltage Trim Range	Pout<=Max rated power	-20		10	%
Trim Up Equations	Please see TRIM functions technical notes				
Trim Down Equations	Please see TRIM functions technical notes				
Output Over-Voltage Protection	Hiccup mode; over full temp range; % of nominal Vout		125		%
Over-Temperature Shutdown					
Without Baseplate		115	125	130	°C
With Baseplate		115	125	130	°C
MECHANICAL SPECIFICATIONS					
Outline Dimensions – W/O Baseplate	(LxWxH)		2.30 x 0.90 x 0.40		Inches
			58.4 x 22.9 x 10.2		mm
Weight – Without Baseplate			0.88		Ounces
			25		Grams
Outline Dimensions – With Baseplate	(LxWxH)		2.30 x 0.90 x 0.52		Inches
			58.4 x 22.9 x 13.2		mm
Weight – With Baseplate			1.30		Ounces
			37		Grams
Through Hole Pin Diameter			0.060 & 0.040		Inches
			1.52 & 1.02		mm
Through Hole Pin Material			Copper alloy		
TH Pin Plating Metal and Thickness	Nickel subplate		50		µ-inches
	Gold overplate		5		µ-inches
Baseplate Material			Aluminum		
RELIABILITY/SAFETY/ENVIRONMENTAL					
Safety	Certified to UL 60950-1, CSA-C22.2 No.60950-1, IEC 60950-1, 2nd Edition		YES		
Calculated MTBF	Belcore, Telcordia SR-332,Issue 2, Method 1, Class 1, Gf		1.7		MHrs
Conducted Emissions	External filter is required, see technical notes		EN55022/CISPR22 CLASS B		
RoHS Rating			RoHS-6		

TYPICAL PERFORMANCE DATA, UWE-12/10-Q12

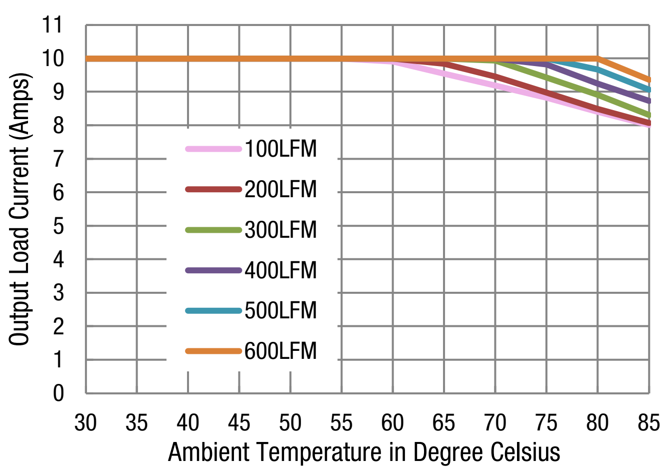
Efficiciency VS. Line Voltage and Load Current @25°C



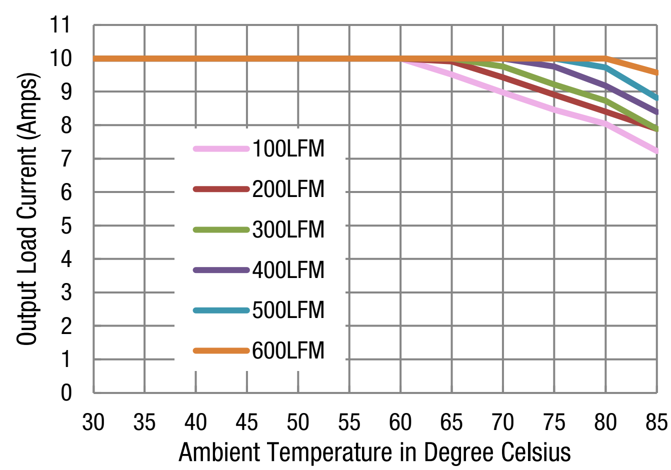
Power Dissipation vs. Load Current @ 25°C



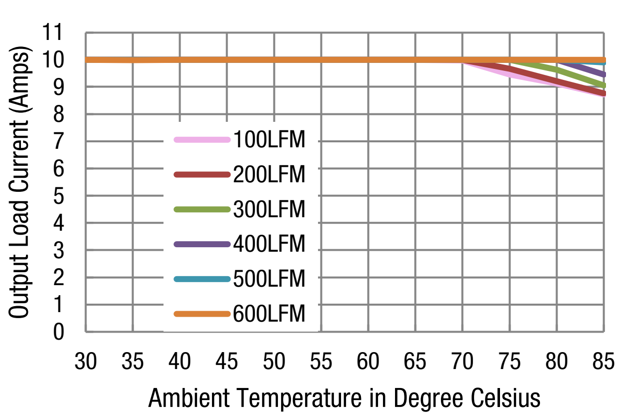
Maximum Current Temperature Derating (Open Frame)
(Vin = 9V airflow is from Vin- to Vin+)



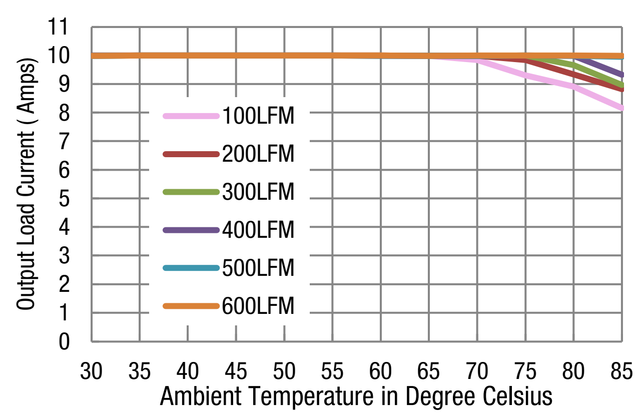
Maximum Current Temperature Derating (Open Frame)
(Vin = 9V airflow is from Vin to Vout)



Maximum Current Temperature Derating (Open Frame)
(Vin = 12V airflow is from Vin- to Vin+)

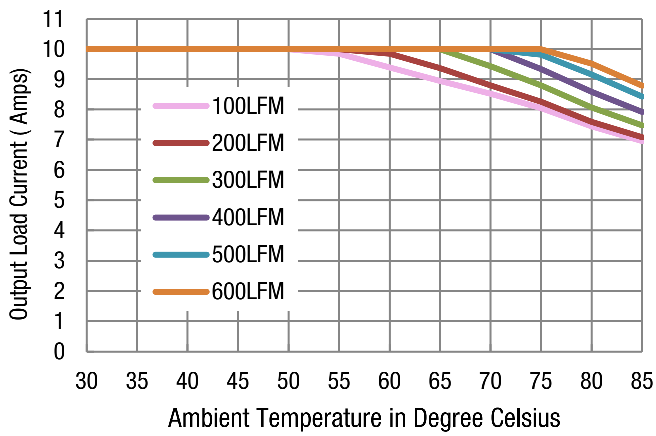


Maximum Current Temperature Derating (Open Frame)
(Vin = 12V airflow is from Vin to Vout)

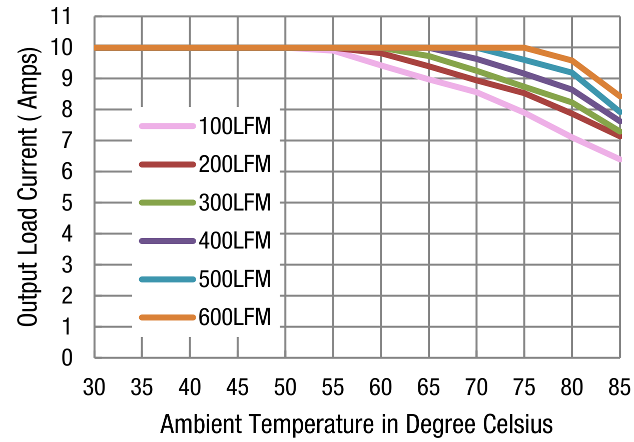


TYPICAL PERFORMANCE DATA, UWE-12/10-Q12

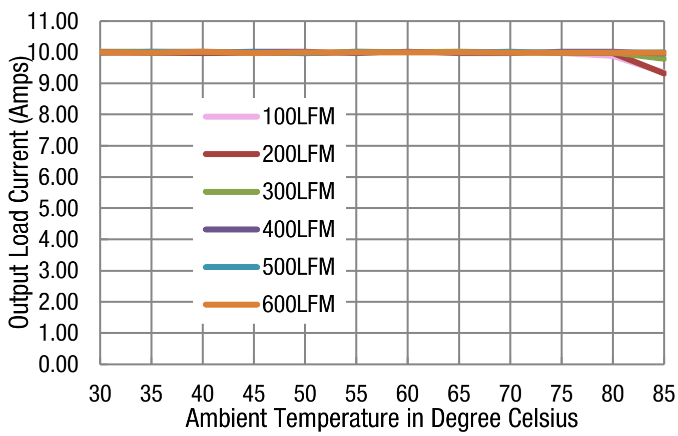
Maximum Current Temperature Derating (Open Frame)
(Vin = 24V airflow is from Vin- to Vin+)



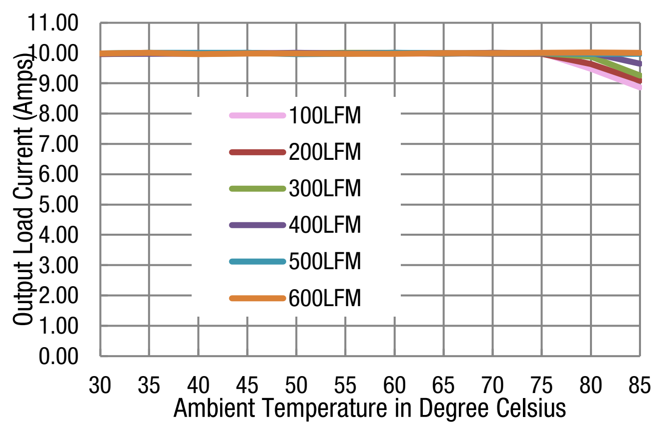
Maximum Current Temperature Derating (Open Frame)
(Vin = 24V airflow is from Vin to Vout)



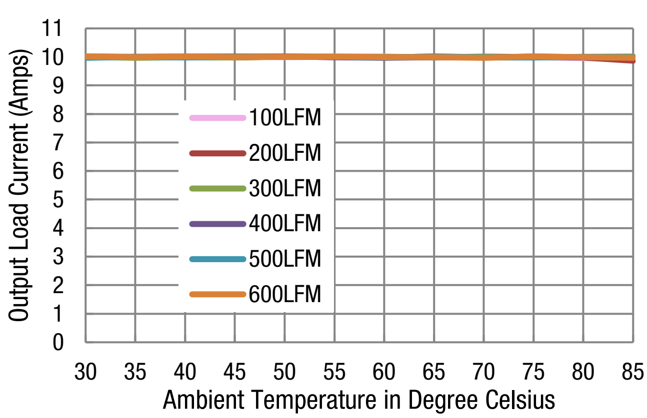
Maximum Current Temperature Derating (With Baseplate)
(Vin = 9V airflow is from Vin- to Vin+)



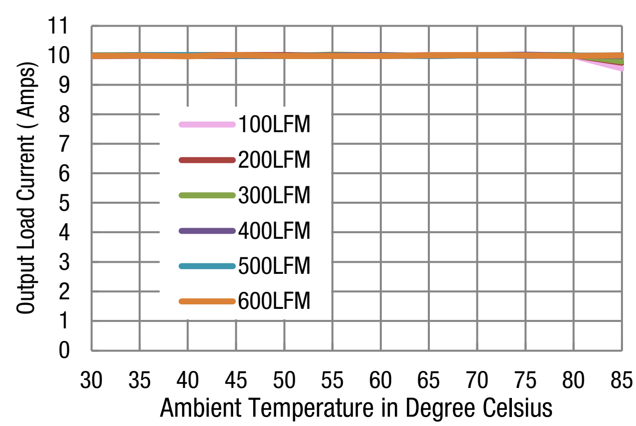
Maximum Current Temperature Derating (With Baseplate)
(Vin = 9V airflow is from Vin to Vout)



Maximum Current Temperature Derating (With Baseplate)
(Vin = 12V airflow is from Vin- to Vin+)

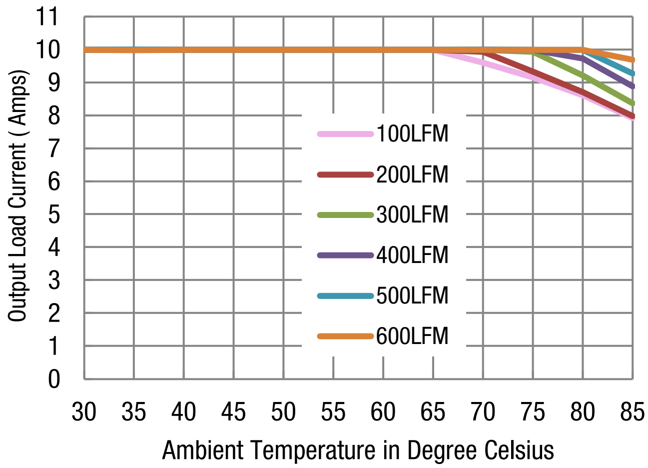


Maximum Current Temperature Derating (With Baseplate)
(Vin = 12V airflow is from Vin to Vout)

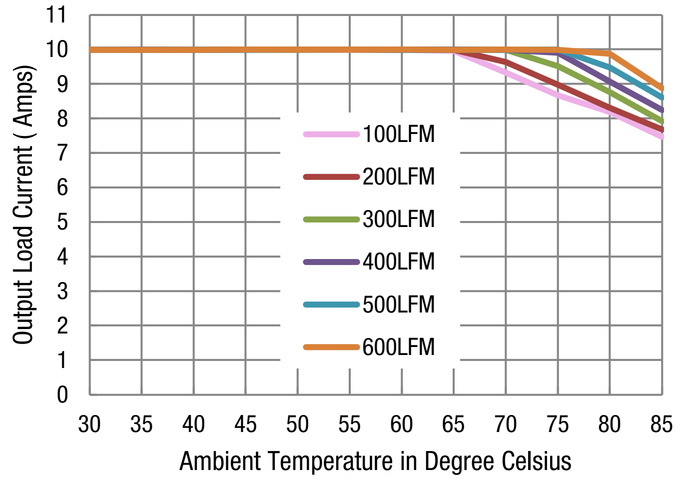


TYPICAL PERFORMANCE DATA, UWE-12/10-Q12

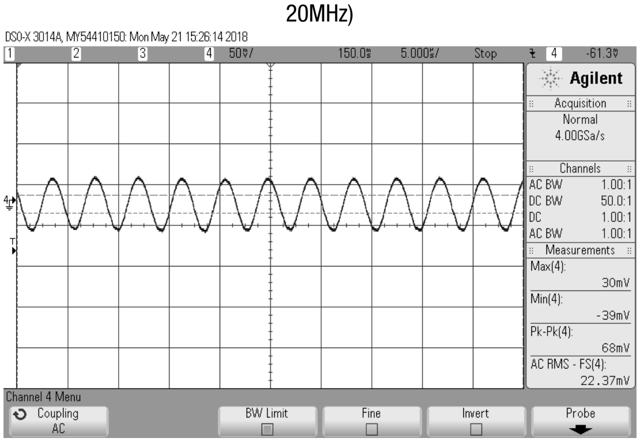
Maximum Current Temperature Derating (With Baseplate)
(Vin = 24V airflow is from Vin- to Vin+)



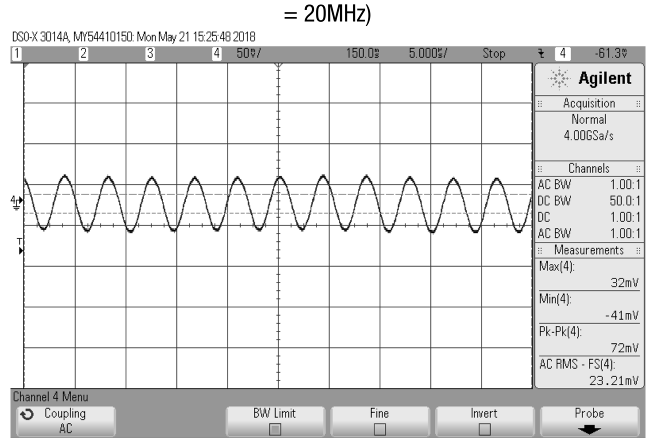
Maximum Current Temperature Derating (With Baseplate)
(Vin = 24V airflow is from Vin to Vout)



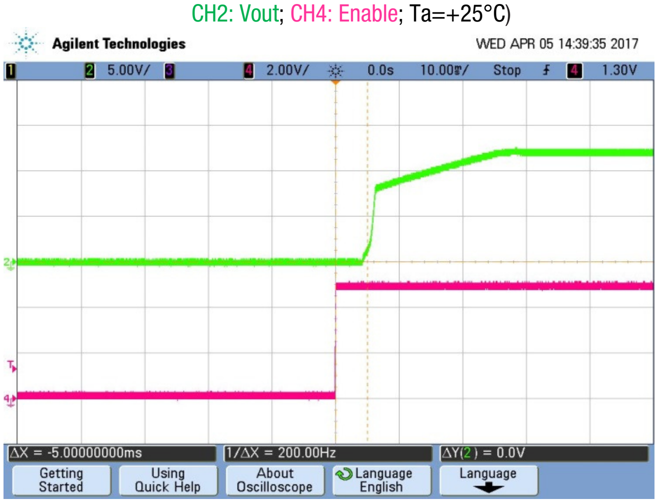
Output Ripple and Noise
(Vin =12V Iout=0A Ta=25°C Cload=1µF ceramic||10µF tantalum|| Scope BW = 20MHz)



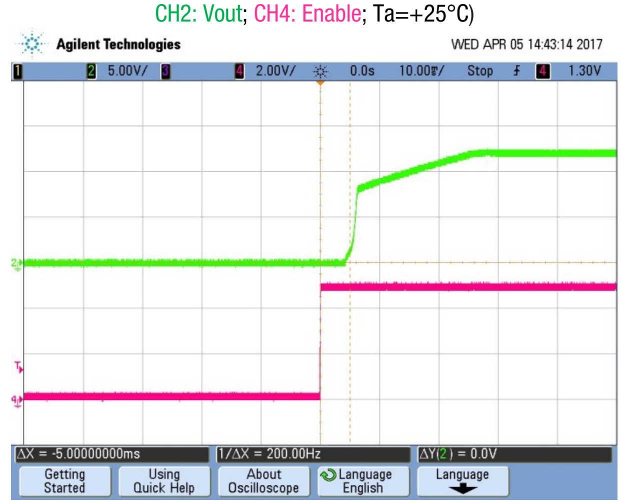
Output Ripple and Noise
(Vin =12V Iout=24A Ta=25°C Cload=1µF ceramic||10µF tantalum||Scope BW = 20MHz)



On/Off Enable Delay (Vin = 12V Vout= nom Iload =0A Cload = 200µF
CH2: Vout; CH4: Enable; Ta=+25°C)



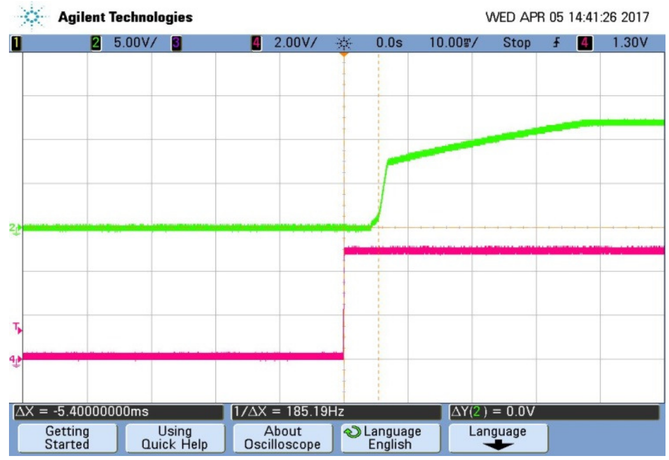
On/Off Enable Delay (Vin = 12V Vout= nom Iload =0A Cload=4700µF
CH2: Vout; CH4: Enable; Ta=+25°C)



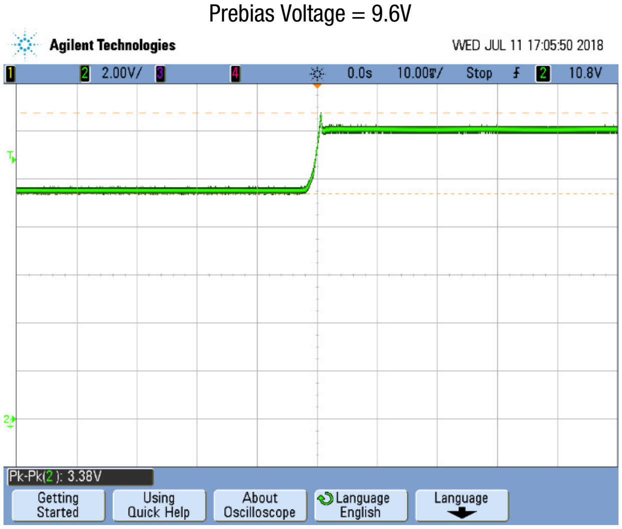
TYPICAL PERFORMANCE DATA, UWE-12/10-Q12

On/Off Enable Delay (Vin = 12V Vout= nom Iload =10A Cload = 200µF
CH2: Vout; CH4: Enable; Ta=+25°C)

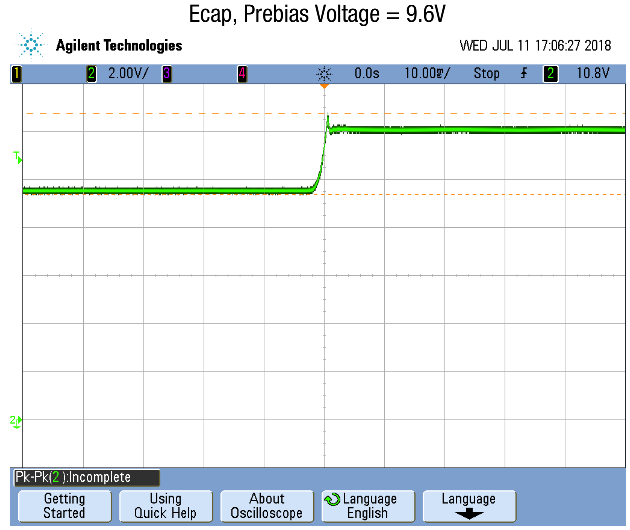
On/Off Enable Delay (Vin = 12V Vout= nom Iload =10A Cload=4700µF
CH2: Vout; CH4: Enable; Ta=+25°C)



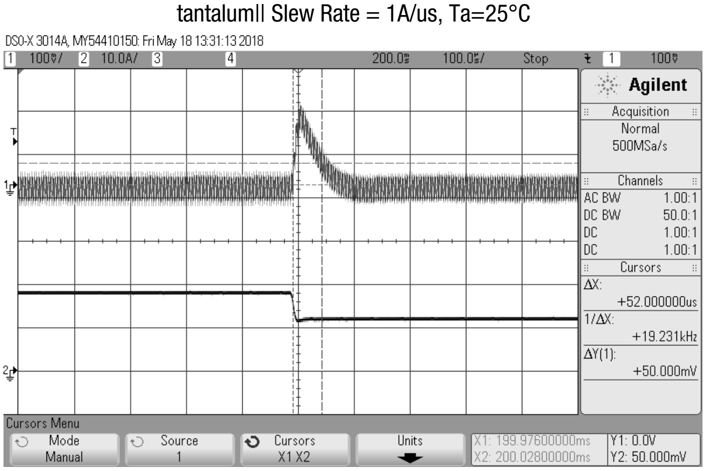
Ta = 25C Vin = 12V Iload = 0A Cload=1uF ceramic||10uF tantalum||200uF Ecap, Prebias Voltage = 9.6V



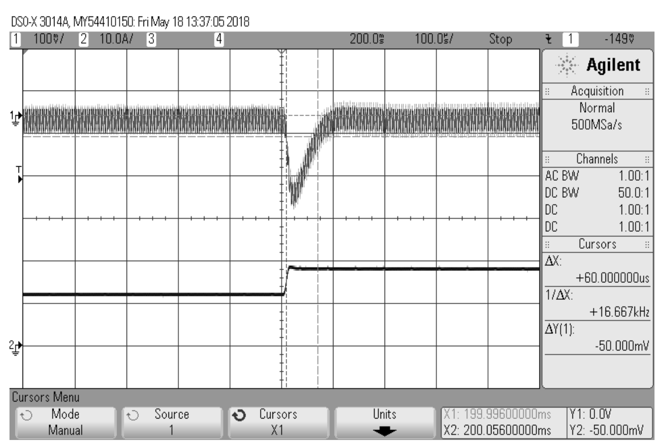
Ta = 25C Vin = 12V Iload = 0A Cload=1uF ceramic||10uF tantalum||4700uF Ecap, Prebias Voltage = 9.6V



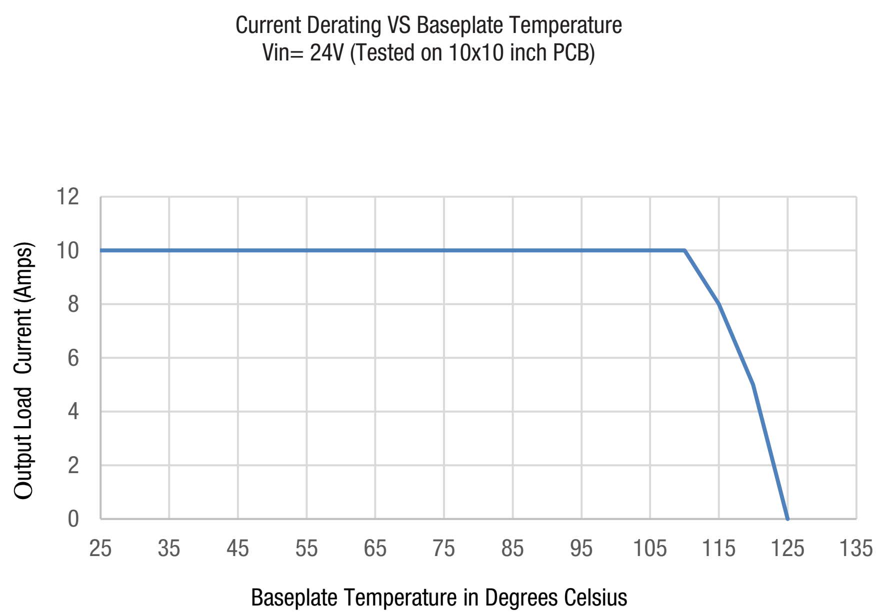
Step load transient response
Vin = 12V Vout= Nom, Iout=50-75% Step of Full load,Cload=1µF ceramic||10µF tantalum|| Slew Rate = 1A/us, Ta=25°C



Step load transient response
Vin = 12V Vout= Nom, Iout=50-75% Step of Full load, Cload=1µF ceramic||10µF tantalum||Slew Rate = 1A/us, Ta=25°C



TYPICAL PERFORMANCE DATA, UWE-12/10-Q12



FUNCTIONAL SPECIFICATIONS, UWE-24/5-Q12

ABSOLUTE MAXIMUM RATINGS	Notes and Conditions	Min.	Typ.	Max.	Units
Input Voltage					
Operating	Continuous	9		36	Vdc
Transient Operating	100mS			50	Vdc
Operating Ambient Temperature		-40		85	°C
Storage Temperature		-45		125	°C
Input/Output Isolation Voltage				2250	Vdc
Voltage at ON/OFF input pin		-2		18	Vdc
INPUT CHARACTERISTICS					
Operating Input Voltage Range		9	12	36	Vdc
Input Under-Voltage Lockout					
Turn-On Voltage Threshold		8.1	8.5	8.95	Vdc
Turn-Off Voltage Threshold		7.8	8.4	8.8	Vdc
Lockout Voltage Hysteresis			0.4	1.0	Vdc
Reverse Polarity Protection			NA		
Maximum Input Current	Full Load, Vin=9V			14.96	A
No-Load Input Current	Vin=12V		80	150	mA
Disabled Input Current (Option N)	Vin=12V		8	15	mA
Disabled Input Current (Option P)	Vin=12V		8	15	mA
Recommended Input Fuse	Fast acting external fuse recommended			20	A
Recommended External Input Capacitance			220		μF
Inrush Current (I^2t)			0.1	0.2	A^2S
OUTPUT CHARACTERISTICS					
Total Output Power	See Derating		120	120	W
Output Voltage Set Point	Vin=Nominal, Io=0A, Ta=25°C	23.76	24.00	24.24	Vdc
Output Voltage Regulation					
Over Load	Vin=12V, Iout from Min to Max		±0.2	±0.4	%
Over Line	Iout=Full load, Vin from Min to Max. Note 2		±0.2	±0.4	%
Over Temperature	Vin=12V, Ta=-40°C to 85°C		NA		mV
Total Output Voltage Range	Over sample, line, load, temperature & life	23.76		24.24	Vdc
Output Voltage Ripple and Noise	20MHz bandwidth				
Peak-to-Peak	Full Load, 1μF ceramic, 10μF tantalum & 100μF E-Cap		150	240	mVp-p
Peak-to-Peak	All conditions, 1μF ceramic, 10μF tantalum & 100μF E-Cap			240	mVp-p
Operating Output Current Range		0		5	A
Output DC Current-Limit Inception	Output Voltage 10% Low	6	6.5	8.5	A
Output Capacitance	Nominal Vout at full load	100		1000	μF
EFFICIENCY					
100% Load	Vin=Nominal	90	92		%
50% Load	Vin=Nominal	91	93		%
100% Load	All Conditions	88			%
DYNAMIC CHARACTERISTICS					
Output Voltage During Load Current Transient					
Step Change	50% to 75% to 50% Iout max, 1μF+10μF+100μF load cap, 1A/μS			±350	mV
Settle Time	To within 1% Vout nom			200	μS
Turn-On Transient					

FUNCTIONAL SPECIFICATIONS, UWE-24/5-Q12

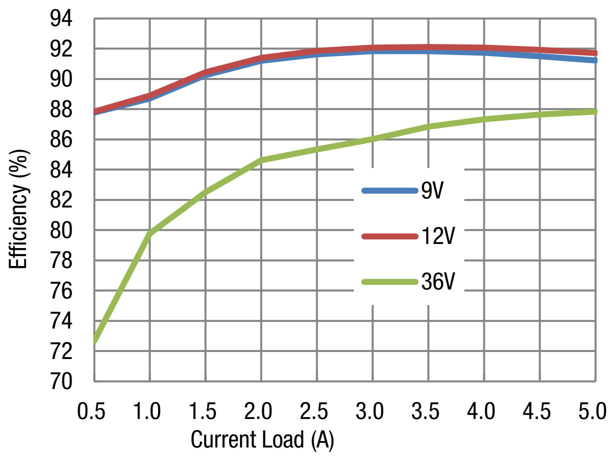
DYNAMIC CHARACTERISTICS					
Start-up Time, From ON/OFF Control	To Vout=90% nominal		30	60	mS
Start-up Time, From Input	To Vout=90% nominal		30	60	mS
Start-up Delay, From ON/OFF Control	To Vout=10% nominal		NA		mS
Start-up Delay, From Input	To Vout=10% nominal		NA		mS
Rise Time	Time from 10% to 90% of nominal output voltage		20	40	mS
Output Voltage Overshoot				2	%
ISOLATION CHARACTERISTICS					
Insulation Safety Rating			Basic		
Input to Output			2250		Vdc
Input to Baseplate			1500		Vdc
Output to Baseplate			1500		Vdc
Isolation Resistance	Input/Output		30		MΩ
Isolation Capacitance	Input/Output		1000		pF
TEMPERATURE LIMITS FOR POWER DERATING CURVES					
Semiconductor Junction Temperature				Tjmax-25	°C
Board Temperature	UL rated max operating temp 130°C			130	°C
Transformer/Inductor Temperature				130	°C
FEATURE CHARACTERISTICS					
Switching Frequency	See from Input Terminals		240		kHz
ON/OFF Control (Option P)					
Off-State Voltage		-0.1		0.8	V
On-State Voltage	Open the ON/OFF pin = ON	2.5		18	V
ON/OFF Control (Option N)					
Off-State Voltage	Open the ON/OFF pin = OFF	2.5		18	V
On-State Voltage		-0.1		0.8	V
ON/OFF Control Current (Either Option)					
Current thru ON/OFF pin	Von/off=0V			1	mA
Current thru ON/OFF pin	Von/off=15V			50	μA
Remote Sense Compensation				10	%
Output Voltage Trim Range	Pout<=Max rated power	-20		10	%
Trim Up Equations	Please see TRIM functions technical notes				
Trim Down Equations	Please see TRIM functions technical notes				
Output Over-Voltage Protection	Hiccup mode; over full temp range; % of nominal Vout	116	125	145	%
Over-Temperature Shutdown					
Without Baseplate		115	125	130	°C
With Baseplate		115	125	130	°C
Restart Hysteresis			NA		°C

FUNCTIONAL SPECIFICATIONS, UWE-24/5-Q12

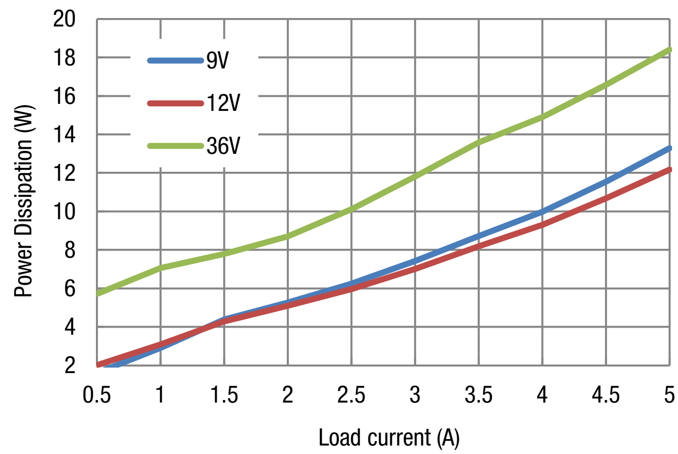
MECHANICAL SPECIFICATIONS					
Outline Dimensions – W/O Baseplate	(LxWxH)		2.30 x 0.90 x 0.40		Inches
			58.4 x 22.9 x 10.2		mm
Weight – Without Baseplate			0.88		Ounces
			25		Grams
Outline Dimensions – With Baseplate	(LxWxH)		2.30 x 0.90 x 0.52		Inches
			58.4 x 22.9 x 13.2		mm
Weight – With Baseplate			1.30		Ounces
			37		Grams
Through Hole Pin Diameter			0.060 & 0.040		Inches
			1.52 & 1.02		mm
Through Hole Pin Material			Copper alloy		
TH Pin Plating Metal and Thickness	Nickel subplate		50		μ-inches
	Gold overplate		5		μ-inches
Baseplate Material			Aluminum		
RELIABILITY/SAFETY/ENVIRONMENTAL					
Safety	Certified to UL 60950-1, CSA-C22.2 No.60950-1, IEC 60950-1, 2nd Edition		YES		
Calculated MTBF	Belcore, Telcordia SR-332,Issue 2, Method 1, Class 1, Gf		1.7		MHrs
Conducted Emissions	External filter is required, see technical notes	EN55022/CISPR22 CLASS B			
RoHS Rating			RoHS-6		

TYPICAL PERFORMANCE DATA, UWE-24/5-Q12

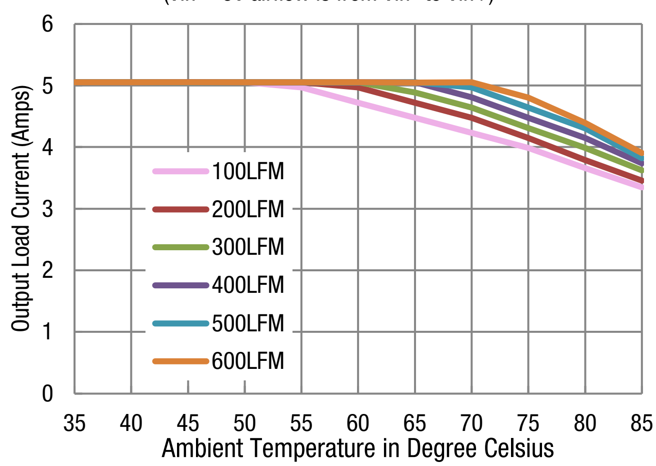
Eficiciency VS. Line Voltage and Load Current @25°C



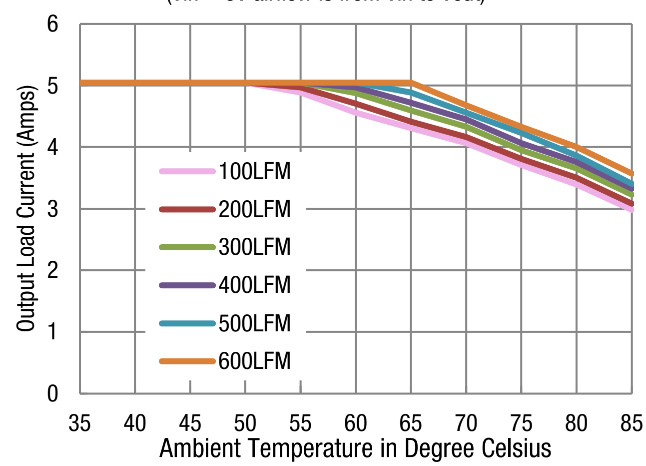
Power Dissipation vs. Load Current @ 25°C



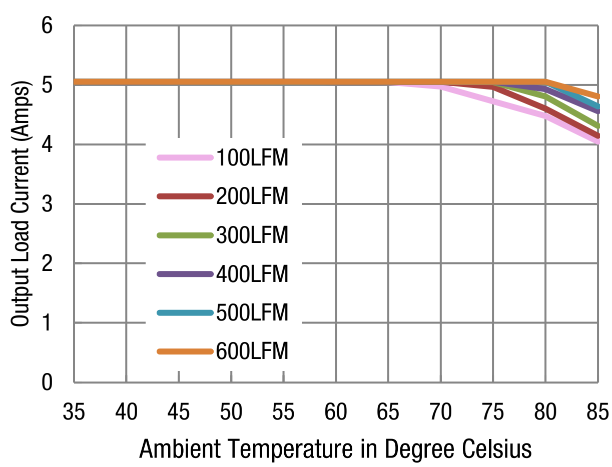
Maximum Current Temperature Derating (Open Frame)
(Vin = 9V airflow is from Vin- to Vin+)



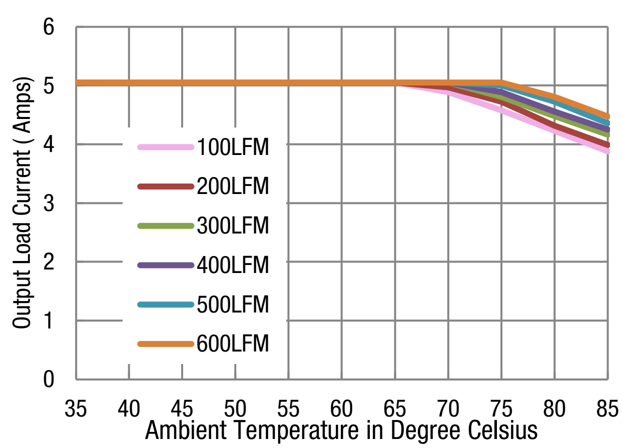
Maximum Current Temperature Derating (Open Frame)
(Vin = 9V airflow is from Vin to Vout)



Maximum Current Temperature Derating (Open Frame)
(Vin = 12V airflow is from Vin- to Vin+)

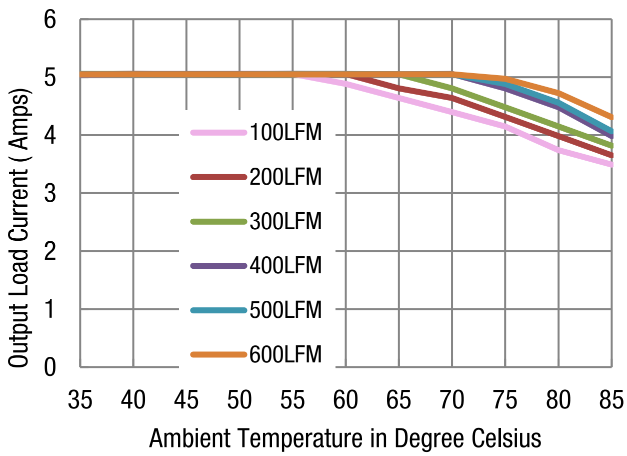


Maximum Current Temperature Derating (Open Frame)
(Vin = 12V airflow is from Vin to Vout)

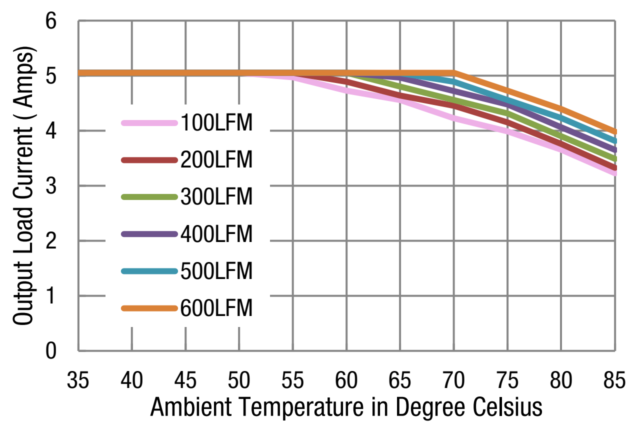


TYPICAL PERFORMANCE DATA, UWE-24/5-Q12

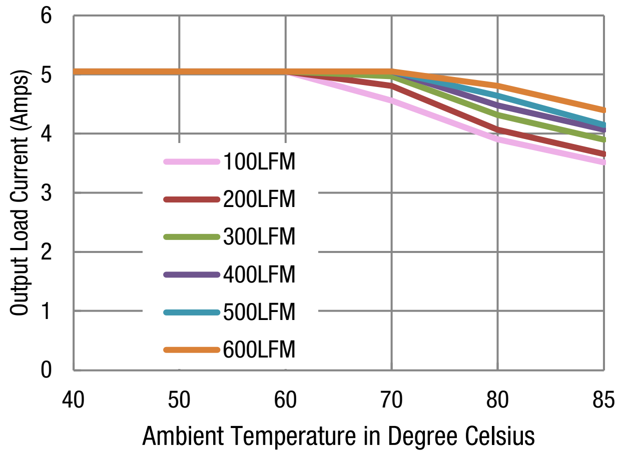
Maximum Current Temperature Derating (Open Frame)
(Vin = 24V airflow is from Vin- to Vin+)



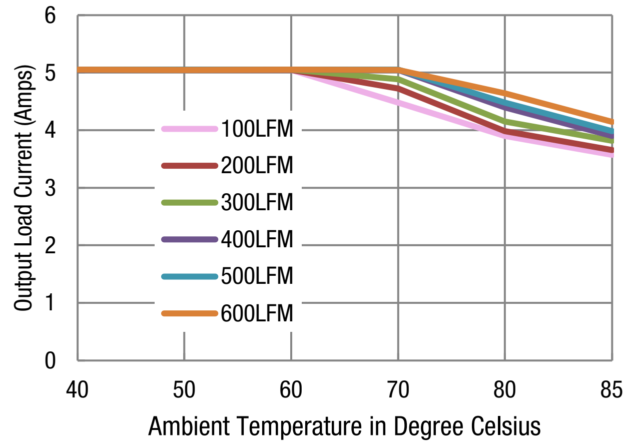
Maximum Current Temperature Derating (Open Frame)
(Vin = 24V airflow is from Vin to Vout)



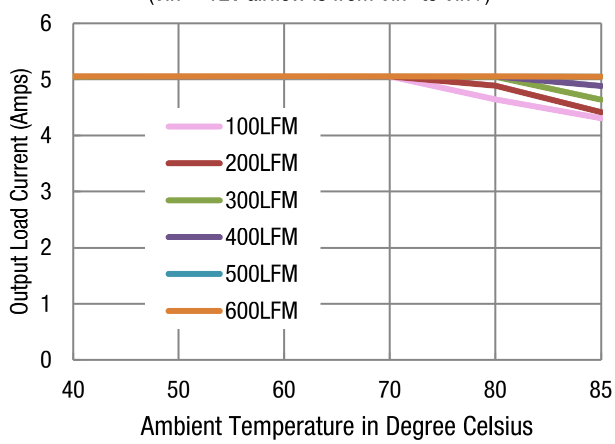
Maximum Current Temperature Derating (With Baseplate)
(Vin = 9V airflow is from Vin- to Vin+)



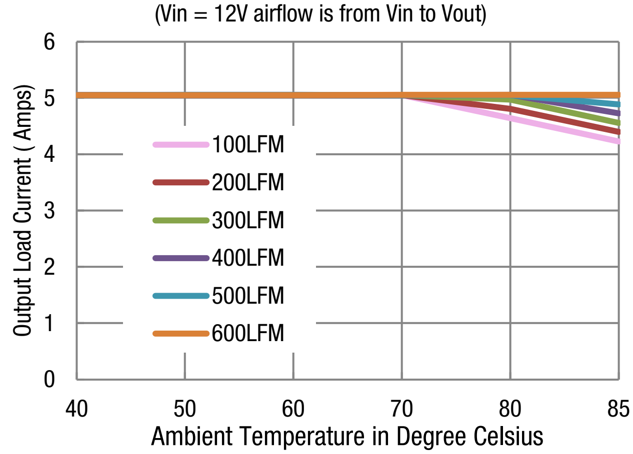
Maximum Current Temperature Derating (With Baseplate)
(Vin = 9V airflow is from Vin to Vout)



Maximum Current Temperature Derating (With Baseplate)
(Vin = 12V airflow is from Vin- to Vin+)

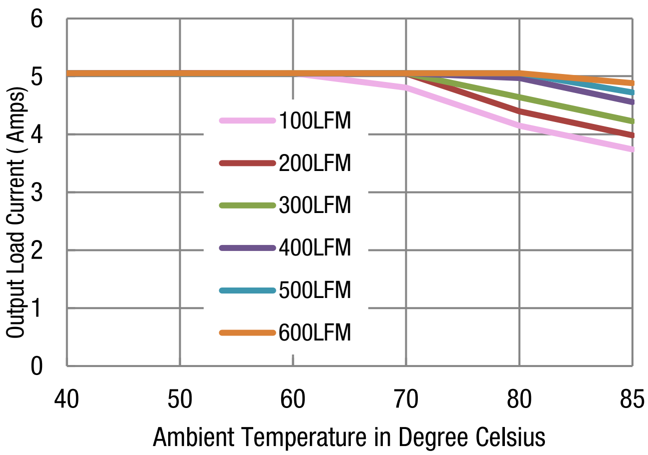


Maximum Current Temperature Derating (With Baseplate)
(Vin = 12V airflow is from Vin to Vout)

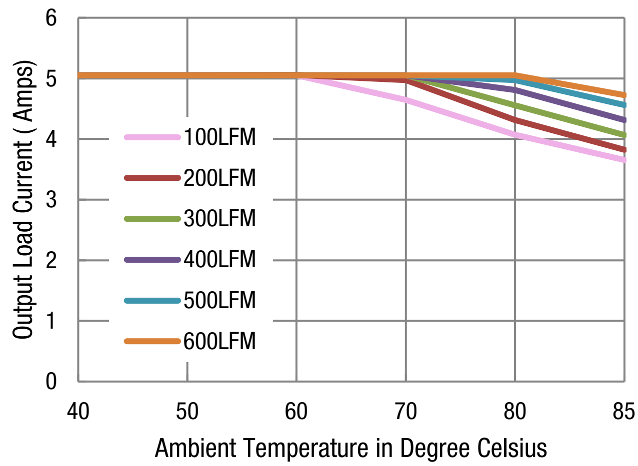


TYPICAL PERFORMANCE DATA, UWE-24/5-Q12

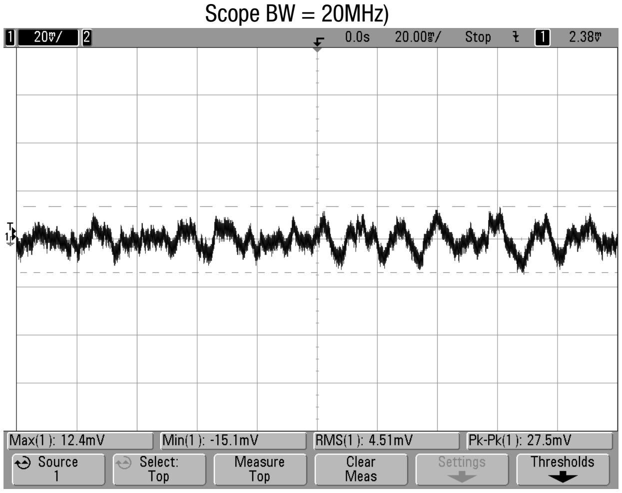
Maximum Current Temperature Derating (With Baseplate)
(Vin = 24V airflow is from Vin- to Vin+)



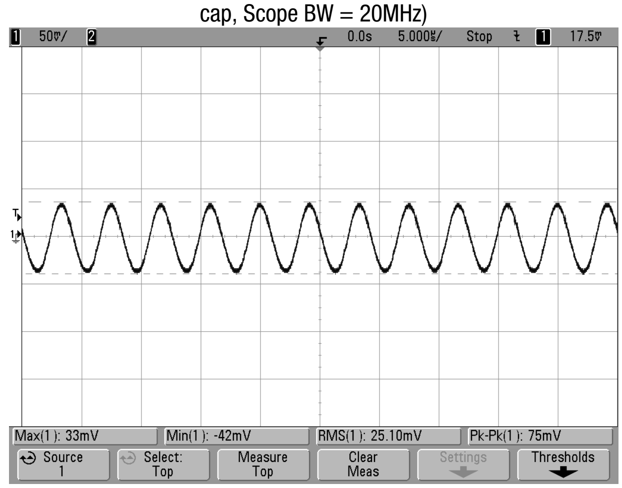
Maximum Current Temperature Derating (With Baseplate)
(Vin = 24V airflow is from Vin to Vout)



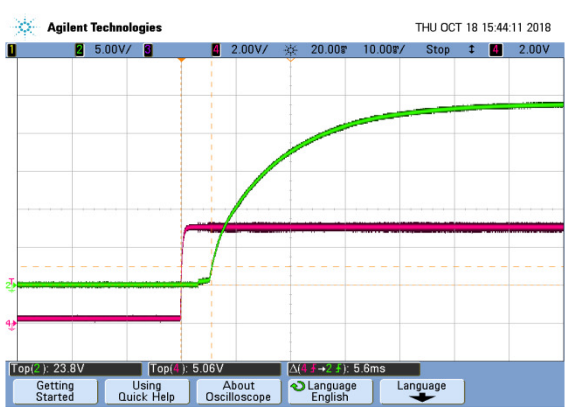
Output Ripple and Noise
(Vin =12V Iout=0A Ta=25°C Cload=1µF ceramic||10µF tantalum|| 100µF Ecap, Scope BW = 20MHz)



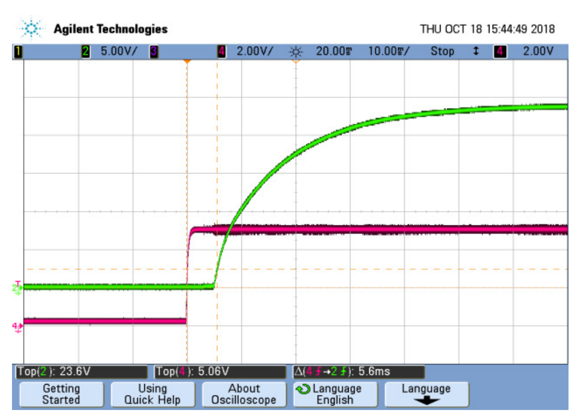
Output Ripple and Noise
(Vin =12V Iout=5A Ta=25°C Cload=1µF ceramic||10µF tantalum||100µF E-cap, Scope BW = 20MHz)



On/Off Enable Delay (Vin = 12V Vout= nom Iload =0A Cload=100µF
CH2: Vout; CH4: Enable; Ta=+25°C)

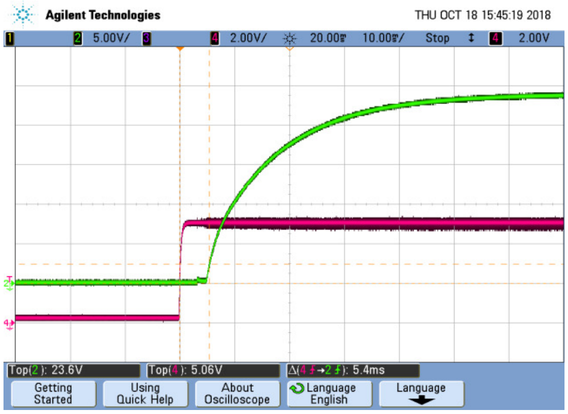


On/Off Enable Delay (Vin = 12V Vout= nom Iload =0A Cload=1000µF
CH2: Vout; CH4: Enable; Ta=+25°C

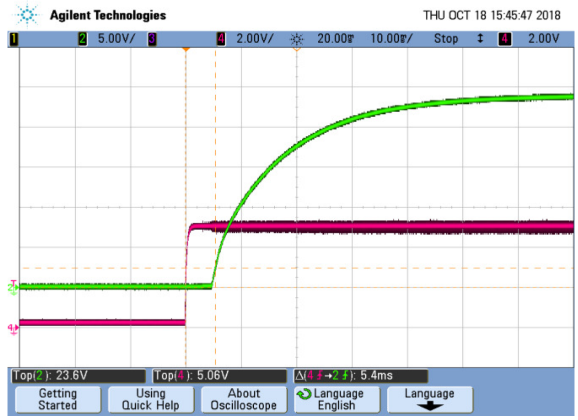


TYPICAL PERFORMANCE DATA, UWE-24/5-Q12

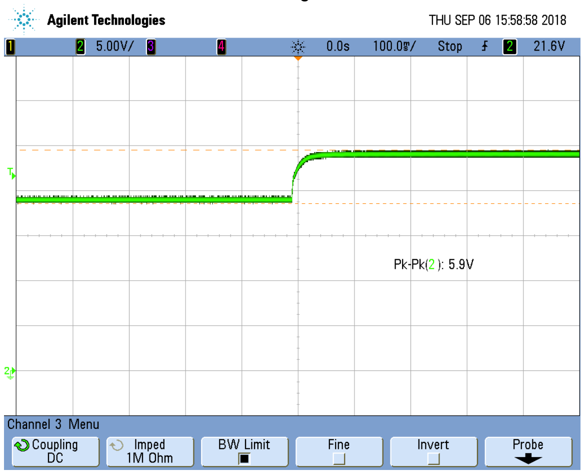
On/Off Enable Delay (Vin = 12V Vout= nom Iload =5A Cload=100µF
CH2: Vout; CH4: Enable; Ta=+25°C)



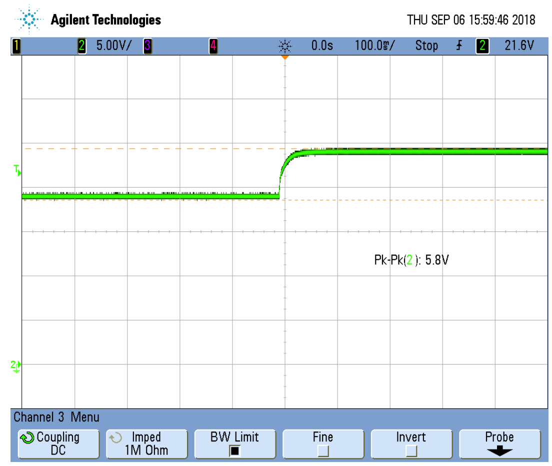
On/Off Enable Delay (Vin = 12V Vout= nom Iload =5A Cload=1000µF
CH2: Vout; CH4: Enable; Ta=+25°C)



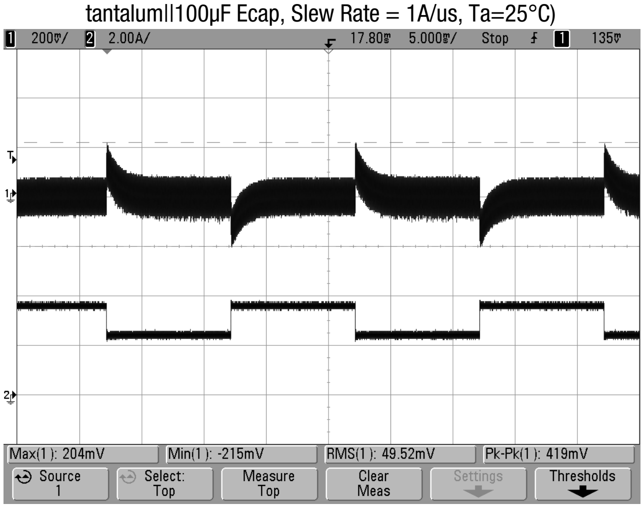
Ta = 25°C Vin = 12V Iload = 0A Cload=1µF ceramic||10µF tantalum||100µF Ecap,
Prebias Voltage = 19.2V



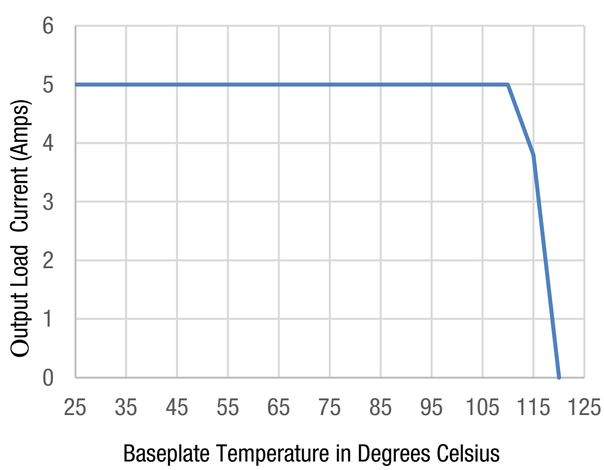
Ta = 25°C Vin = 12V Iload = 0A Cload=1µF ceramic||10µF
tantalum||1000µF Ecap, Prebias Voltage = 19.2V



Step Load Transient Response
(Vin = 12V Vout= Nom, Iout=50-75% Step of Full load,Cload=1µF ceramic||10µF
tantalum||100µF Ecap, Slew Rate = 1A/us, Ta=25°C)

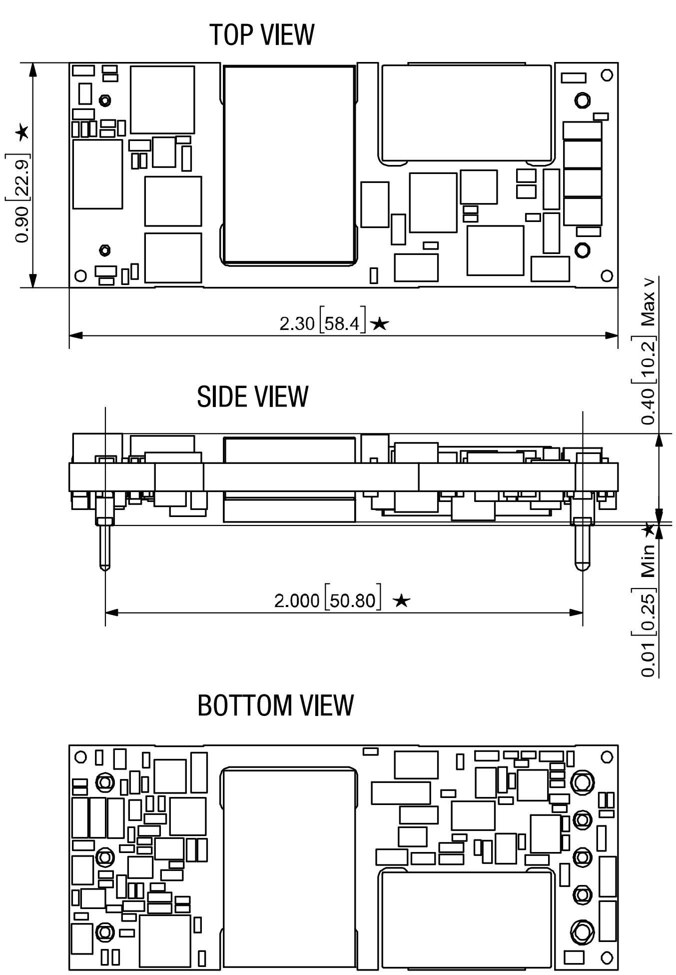


Current Derating VS. Baseplate Temperature
Vin = 24V (Tested on 10 x 10 inch PCB)

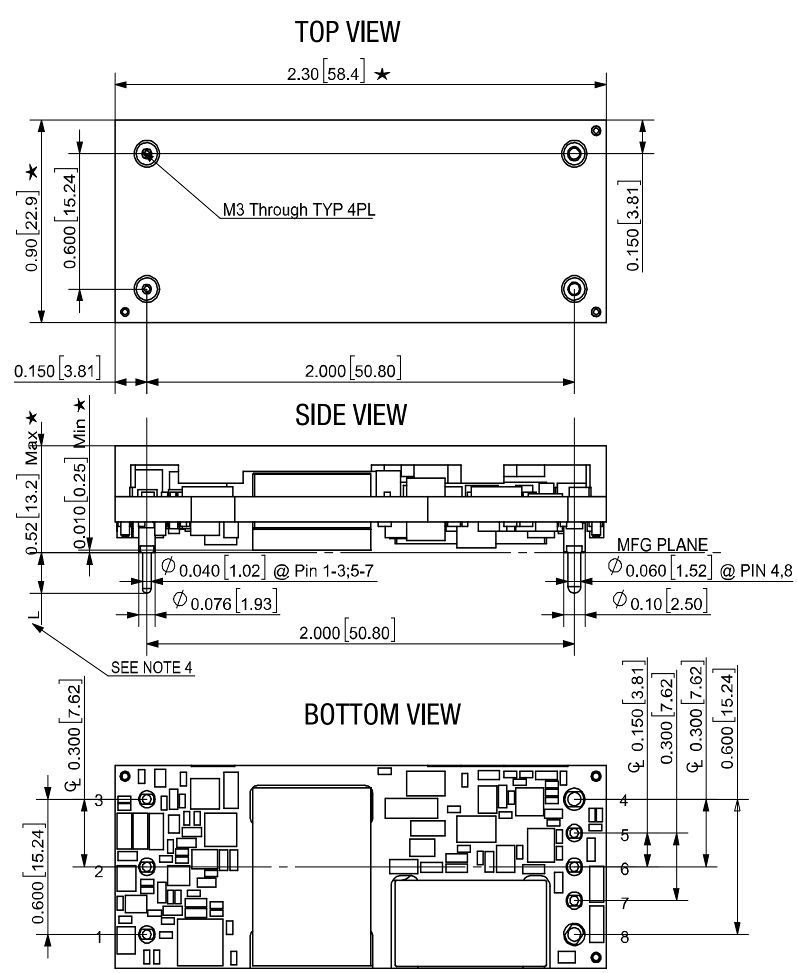


MECHANICAL SPECIFICATION

OPEN FRAME

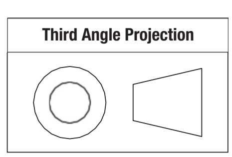


WITH BASEPLATE



Notes:
UNLESS OTHERWISE SPECIFIED:
1. ALL DIMENSIONS ARE IN INCHES [MILIMETER].
2. ALL TOLERANCE:
   a) x.xx in, ±0.02in (x.xx mm, ±0.5 mm).
   b) x.xx in, ±0.01in (x.xx mm, ±0.25 mm)
3. M3 SCREW USED TO BOLT UNIT'S BASEPLATE TO OTHER SURFACE (SUCH AS HEATSINK) MUST NOT EXCEED 0.110INCH (2.8mm) DEPTH BELOW THE SURFACE OF BASEPLATE.
4. STANDARD PIN LENGTH: 0.18in;
   a) OPTIONAL L1 PIN LENGTH: 0.110 in;
   b) OPTIONAL L2 PIN LENGTH: 0.145 in.

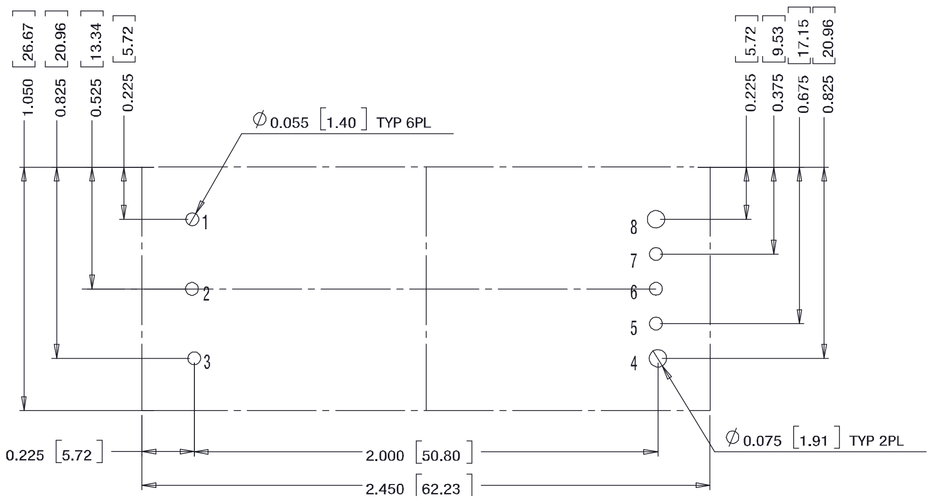
Dimensions are in inches (mm) shown for ref. only.



Tolerance (unless otherwise specified):
.XX ± 0.02 (0.5)
.XXX ± 0.010 (0.25)
Angels ± 1°

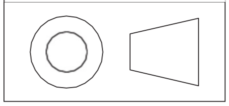
Components are shown for reference only and may vary between units.

RECOMMENDED FOOTPRINT



Dimensions are in inches (mm) shown for ref. only.

Third Angle Projection

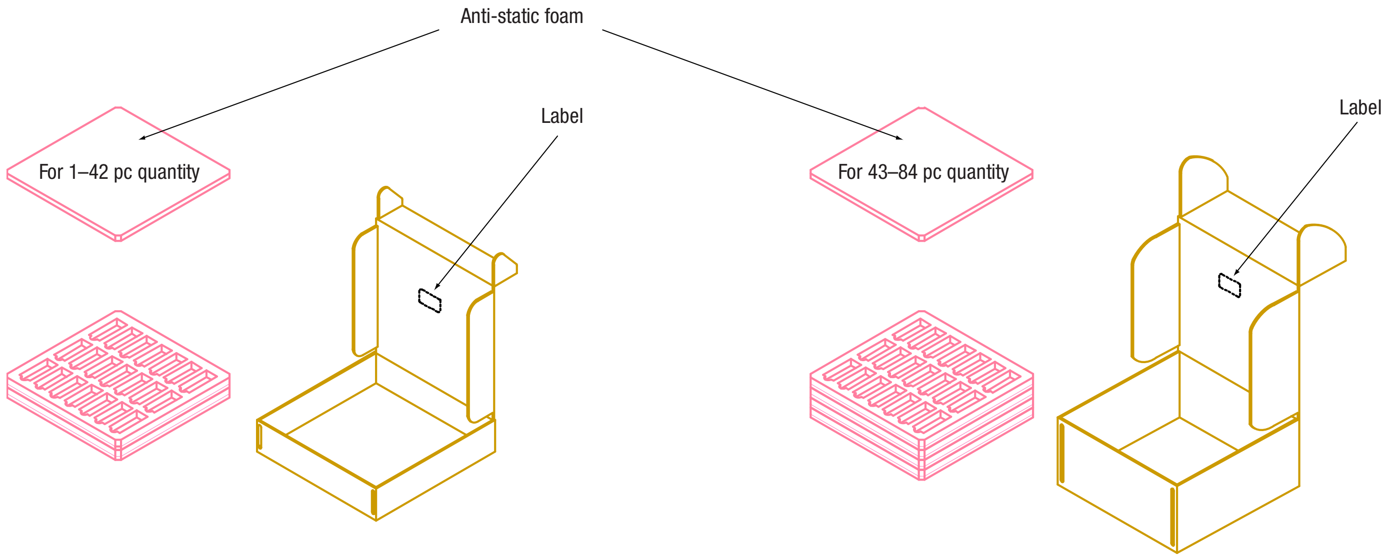


Tolerance (unless otherwise specified):
.XX ± 0.02 (0.5)
.XXX ± 0.010 (0.25)
Angles ± 1°

Components are shown for reference only and may vary between units.

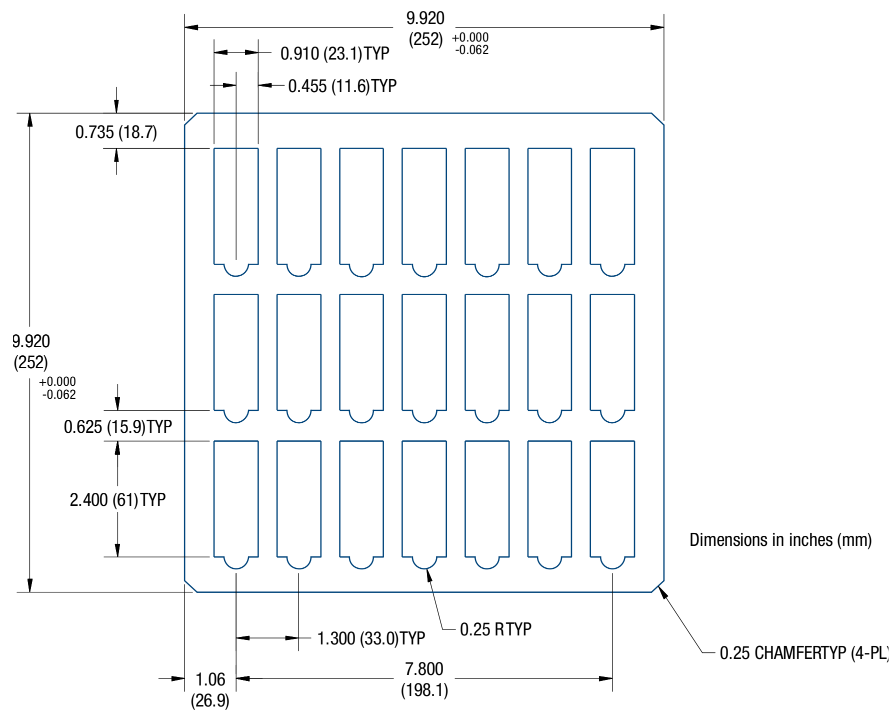
INPUT/OUTPUT CONNECTIONS	
Pin Number	Function
1	Vin (+)
2	On/Off
3	Vin
4	Vout(-)
5	Sense(-)
6	Trim
7	Sense(+)
8	Vout(+)

SHIPPING TRAYS AND BOXES, THROUGH-HOLE MOUNT

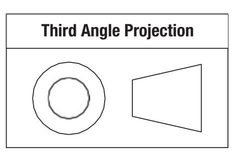


SHIPPING TRAY DIMENSIONS

Material: Low density closed cell polyethylene static dissipative foam



Dimensions are in millimeters
Tolerance (unless otherwise specified)
.xx ± 0.5
.xxx ± 0.25
Angles ± 2°



TECHNICAL NOTES

Input Fusing

Most if not all applications and/or safety agencies will require the installation of an external input fuse for power conversion components to meet specific safety agency requirements. For Murata Power Solutions UWE-Q12 series DC-DC converters, we recommend the use of a fast blow fuse, installed in the ungrounded input supply line. See recommended fuse value specified for each module.

All relevant national and international safety standards and regulations must be observed by the installer. For system safety agency approvals, the converters must be installed in compliance with the requirements of the end use safety standard, i.e. IEC/EN/UL60950-1.

Input Reverse-Polarity Protection

If the input voltage polarity is accidentally reversed, an internal diode will become forward biased and likely draw excessive current from the power source. If this source is not current limited or the circuit appropriately fused, it could cause permanent damage to the converter.

There is no Input reverse-Polarity Protection. An external circuit must be added.

Input Under-Voltage Shutdown and Start-Up Threshold

Under normal start-up conditions, devices will not begin to regulate properly until the ramping-up input voltage exceeds the Start-Up Threshold Voltage. Once operating, devices will not turn off until the input voltage drops below the Under-Voltage Shutdown limit. Subsequent re-start will not occur until the input is brought back up to the Start-Up Threshold. This built in hysteresis prevents any unstable on/off situations from occurring at a single input voltage.

Start-Up Time

The V_{IN} to V_{OUT} Start-Up Time is the time interval between the points at which the ramping input voltage crosses the Start-Up Threshold and the fully loaded output voltage reaches and remains above 90% of its specified output voltage.

Actual measured time will vary with input source impedance, external input capacitance, and the slew rate and final value of the input voltage as it appears at the converter. The UWE-Q12 Series implements a soft start circuit to limit the duty cycle of its PWM controller at power up, thereby limiting the input inrush current.

The On/Off Control to V_{OUT} start-up time assumes the converter has its nominal input voltage applied but is turned off via the On/Off Control pin. The specification defines the interval between the points at which the converter is turned on (released) and the fully loaded output voltage reaches and remains above 90% of its specified output voltage. Similar to the V_{IN} to V_{OUT} start-up, the On/Off Control to V_{OUT} start-up time is also governed by the internal soft start circuitry and external load capacitance. The difference in start-up time from V_{IN} to V_{OUT} and from On/Off Control to V_{OUT} is therefore insignificant.

Input Source Impedance

The input of a dc-dc converter acts like a negative resistance and must be compensated by providing a low impedance input source to insure the system will be stable. The dc-dc converter performance and stability will be compromised if the source is not compensated properly

A low ESR Cbus in the input circuit shown below is a practical solution that can be used to minimize the effects of inductance in the input traces. For optimum performance, components should be mounted as close to the DC-DC converter as possible.

There are several papers that have been written regarding this topic and we suggest that that the power systems engineer review for further information:

References:

1) Middlebrook, R.D. “Input Filter Considerations in Design and Application of Switching Regulators” IEE IAS Annual Meeting, 1976

2) Feng, X. et al, “individual Load Impedance Specification for a Stable DC

I/O Filtering, Input Ripple Current, and Output Noise

All models in the UWE-Q12 Series are tested/specified for input reflected ripple current, input terminal ripple current and output noise using the specified external input/output components/circuits and layout as shown in the following figures. External input capacitors (Cbus in Figure 1 Measuring Input Ripple Current and Output Noise) serve primarily as energy-storage elements, minimizing line voltage variations caused by transient IR drops in conductors from backplane to the DC-DC. Input caps should be selected for bulk capacitance (at appropriate frequencies), low ESR, and high RMS-ripple-current ratings. The switching nature of DC-DC converters requires that dc voltage sources have low ac impedance as highly inductive source impedance can affect system stability. The input ripple is measured with simulated source impedance Ls. Capacitor Cs to offset possible battery impedance. Your specific system configuration may necessitate additional considerations.

In critical applications, output ripple/noise (Figure 1. Measurement Input Ripple and Output Noise **Circuit**) may be reduced below specified limits using filtering techniques, the simplest of which is the installation of additional external output capacitors. They function as true filter elements and should be selected for bulk capacitance, low ESR and appropriate frequency response. Care must be taken not to exceed the maximum rated Cout specification as this can cause system instability and possible failure of the dc-dc module.

All external capacitors should have appropriate voltage ratings and be located as close to the converter as possible. Temperature variations for all relevant parameters should also be taken carefully into consideration. The most effective combination of external I/O capacitors will be a function of line voltage and source impedance, as well as particular load and layout conditions.

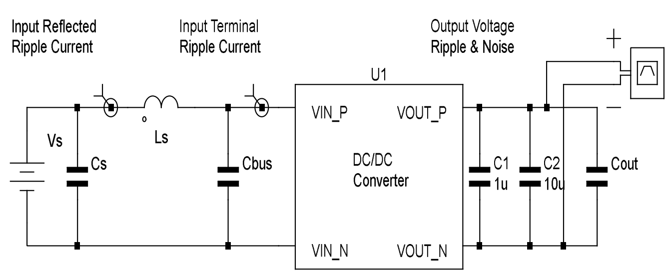


Figure 1. Measurement Input Ripple and Output Noise Circuit

Floating Outputs
Since these are isolated DC-DC converters, their outputs are "floating" with respect to their input. Designers will normally use the –Output as the ground/return of the load circuit. You can however, use the +Output as ground/return to effectively reverse the output polarity.

Thermal Shutdown
The UWE-Q12 series converters are equipped with thermal-shutdown circuitry. If environmental conditions cause the temperature of the DC-DC converter to rise above the designed operating temperature, a precision temperature sensor will power down the unit. When the internal temperature decreases below the threshold of the temperature sensor, the unit will self-start.

The thermal shutdown is set to a point where the semiconductors should never exceed their "maximum ratings". The thermal shutdown is set to avoid "nuisance" shutdown under fault conditions. i.e. if the air conditioning goes down in the data center, the module can run at a higher temperature for some time. We do not recommend that you run the module continuously above the thermal derating curve recommendations.

It is recommended that you fully understand the "recommended operating temperature" and verify that under normal operating conditions the module temperature is not exceeded in your application.
See Performance/Functional Specifications.

Output Over-Voltage Protection
Vout is controlled via a closed loop system and monitored for fault conditions (over voltage, over current) such as an over-voltage condition. If Vout for any reason rises above the specified OVP set point the converter will shut down causing Vout to decrease rapidly (depending on load conditions). Following a time-out period the module will restart causing Vout to ramp to its specified set-point. If the fault condition persists and Vout again exceeds the OVP set point the converter will again enter the shutdown cycle. This on/off cycling is referred to as "hiccup" mode. When the fault condition has been corrected the module will return to normal operations.

Current Limiting
As soon as the output current increases to approximately 130% of its rated value, the DC-DC converter will go into a current-limiting mode. In this condition, the output voltage will decrease proportionately with increases in output current, thereby maintaining somewhat constant power dissipation. This is commonly referred to as power limiting. Current limit inception is defined as the point at which the full-power output voltage falls below the specified tolerance. See Performance/Functional Specifications. If the load current, being drawn from the converter, is significant enough, the unit will go into a short circuit condition as described below.

Short Circuit Condition
When a converter is in current-limit mode, the output voltage will drop as the output current demand increases. If the output voltage drops too low, the magnetically coupled voltage used to develop primary side voltages will also drop, thereby shutting down the PWM controller. Following a time-out period, the PWM will restart causing the output voltage to begin ramping to their appropriate value. If the short-circuit condition persists, another shutdown cycle will be initiated. This on/off cycling is referred to as "hiccup" mode. The hiccup cycling reduces the average output current, thereby preventing internal temperatures from rising to excessive levels. The UWE-Q12 Series is capable of enduring an indefinite short circuit output condition.

On/Off Control
The input-side, remote On/Off Control function can be ordered to operate with Positive ("P" suffix) logic models are enabled when the On/Off pin is left open or is pulled high (see specifications) with respect to the –Input. Positive-logic devices are disabled when the on/off pin is pulled low with respect to the –Input.
Negative ("N" suffix) logic devices are off when the On/Off pin is left open or is pulled high (see specifications), and on when the pin is pulled low with respect to the –Input. See specifications.
Dynamic control of the remote on/off function is best accomplished with a mechanical relay or an open-collector/open-drain drive circuit (optically isolated if appropriate). The drive circuit should be able to sink appropriate current (see Performance Specifications) when activated and withstand appropriate voltage when deactivated.

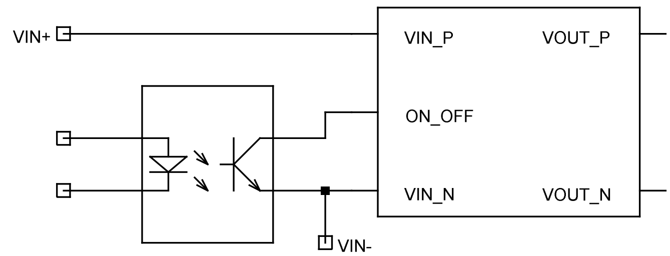


Figure 2. ON/OFF Control Circuit

Remote Sense
Note: The Sense and Vout lines are internally connected through low-value resistors. Nevertheless, if the sense function is not used for remote regulation, the user should connect the +Sense to +Vout and –Sense to –Vout directly at the DC-DC converter pins. UWE series converters employ a sense feature to provide point of use regulation, thereby overcoming moderate IR drops in PCB conductors or cabling. The remote sense lines carry very little current and therefore require minimal cross-sectional-area conductors. The sense lines, which are coupled to their respective output lines, are used by the feedback control-loop to regulate the output. As such, they are not low impedance points and must be treated with care in layouts and cabling. Sense lines on a PCB should be run adjacent to dc signals, preferably ground.

$$[Vout(+) – Vout(-)] – [Sense(+) – Sense(-)] \leq 10\% \times Vout$$

In cables and discrete wiring applications, twisted pair or other techniques should be used. Output over-voltage protection is monitored at the output voltage pin, not the Sense pin. Therefore, excessive voltage differences between Vout and Sense in conjunction with trim adjustment of the output voltage can cause the over-voltage protection circuitry to activate (see Performance Specifications for over-voltage limits).
Power derating is based on maximum output current and voltage at the converter's output pins. Use of trim and sense functions can cause output voltages to increase, thereby increasing output power beyond the converter's specified rating, or cause output voltages to climb into the output over-voltage region. Therefore, the designer must ensure:

$$(\text{Vout at pins}) \times (\text{Iout}) \leq \text{rated output power}$$

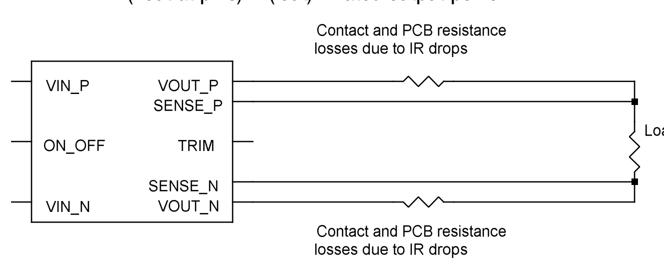


Figure 3. Remote Sense Circuit

Output Voltage Adjustment (TRIM)

The TRIM input permits the user to adjust the output voltage across the sense leads up or down according to the trim range specifications.

To decrease the output voltage, the user should connect a resistor between TRIM pin and SENSE (–) pin. For a desired decrease of the nominal output voltage, the value of the resistor should be:

$$R_{trimdown} = \frac{5.11}{\Delta\%} - 10.22\ (k\Omega)$$

Where:

$$\Delta\% = \left|\frac{V_{nominal} - V_{desired}}{V_{nominal}}\right|$$

To increase the output voltage, the user should connect a resistor between TRIM pin and SENSE (+) pin. For a desired increase of the nominal output voltage, the value of the resistor should be:

$$R_{trimup} = \frac{5.11 \times V_{nominal} \times (1 + \Delta\%)}{1.225 \times \Delta\%} - \frac{5.11}{\Delta\%} - 10.22\ (k\Omega)$$

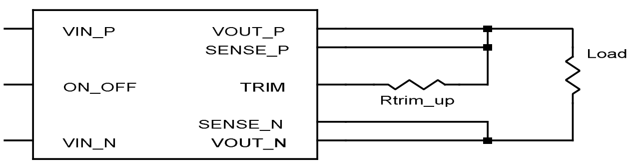


Figure 4. Trim Up connections to increase Vout

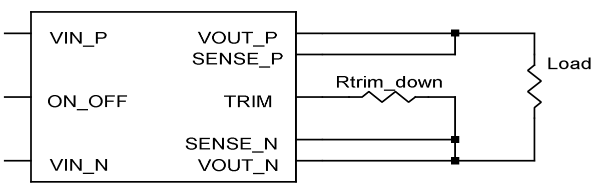


Figure 5. Trim Down connections to decrease Vout

Some detailed trim resistance values are listed in the below table.

	Trim Up Resistance		Trim Down Resistance	
PN	Vout(V)	Rtrim_up(kΩ)	Vout(V)	Rtrim_down kΩ)
UWE-5/24-Q12	5.05	1585	4.9	245.3
	5.1	798	4.8	117.5
	5.15	536	4.7	74.9
	5.2	404	4.6	53.7
	5.25	326	4.5	40.9
	5.3	273	4.4	32.4
	5.35	236	4.3	26.3
	5.4	207	4.2	21.7
	5.45	186	4.1	18.2
	5.5	168	4	15.3

	Trim Up Resistance		Trim Down Resistance	
PN	Vout(V)	Rtrim_up(kΩ)	Vout(V)	Rtrim_down(kΩ)
UWE-12/10-Q12	12.12	4535	11.76	245.3
	12.24	2287	11.52	117.5
	12.36	1538	11.28	74.9
	12.48	1164	11.04	53.7
	12.6	939	10.8	40.9
	12.72	789	10.56	32.4
	12.84	682	10.32	26.3
	12.96	602	10.08	21.7
	13.08	539	9.84	18.2
	13.2	489	9.6	15.3
UWE-24/5-Q12	24.24	9590	23.52	245.3
	24.48	4840	23.04	117.5
	24.72	3257	22.56	74.9
	24.96	2465	22.08	53.7
	25.2	1990	21.6	40.9
	25.44	1673	21.12	32.4
	25.68	1447	20.64	26.3
	25.92	1277	20.16	21.7
	26.16	1145	19.68	18.2
	26.4	1040	19.2	15.3

Note: The Trim feature does not affect the voltage at which the output over-voltage protection (OVP) circuit is triggered. Trimming the output voltage too high may cause the over-voltage protection circuit to trigger, particularly during load transients. For the converter to meet its rated specifications the maximum variation of the dc value of Vout, due to both trimming and remote load voltage drops should not exceed the output voltage trim range.

Vertical Wind Tunnel

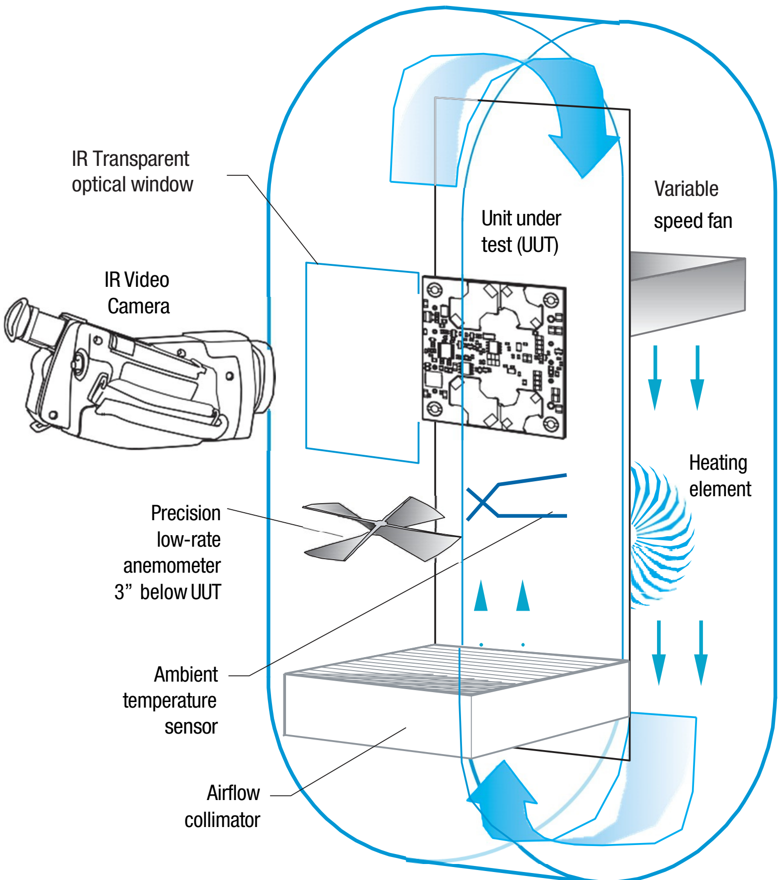


Figure 8. Vertical Wind Tunnel

Murata Power Solutions employs a computer controlled custom-designed closed loop vertical wind tunnel, infrared video camera system, and test instrumentation for accurate airflow and heat dissipation analysis of power products. The system includes a precision low flow-rate anemometer, variable speed fan, power supply input and load controls, temperature gauges, and adjustable heating element.

The IR camera monitors the thermal performance of the Unit Under Test (UUT) under static steady-state conditions. A special optical port is used which is transparent to infrared wavelengths.

Both through-hole and surface mount converters are soldered down to a 10" x 10" host carrier board for realistic heat absorption and spreading. Both longitudinal and transverse airflow studies are possible by rotation of this carrier board since there are often significant differences in the heat dissipation in the two airflow directions. The combination of adjustable airflow, adjustable ambient heat, and adjustable Input/Output currents and voltages mean that a very wide range of measurement conditions can be studied.

The collimator reduces the amount of turbulence adjacent to the UUT by minimizing airflow turbulence. Such turbulence influences the effective heat transfer characteristics and gives false readings. Excess turbulence removes more heat from some surfaces and less heat from others, possibly causing uneven overheating.

Both sides of the UUT are studied since there are different thermal gradients on each side. The adjustable heating element and fan, built-in temperature gauges, and no-contact IR camera mean that power supplies are tested in real-world conditions.

Through-hole Soldering Guidelines

Murata Power Solutions recommends the TH soldering specifications below when installing these converters. These specifications vary depending on the solder type. Exceeding these specifications may cause damage to the product. Your production environment may differ; therefore please thoroughly review these guidelines with your process engineers.

Wave Solder Operations for through-hole mounted products (THMT)	
For Sn/Ag/Cu based solders:	
Maximum Preheat Temperature	115° C.
Maximum Pot Temperature	270° C.
Maximum Solder Dwell Time	7 seconds
For Sn/Pb based solders:	
Maximum Preheat Temperature	105° C.
Maximum Pot Temperature	250° C.
Maximum Solder Dwell Time	6 seconds

MPS Part Number	Product Status	LTB Date
UWE-12/10-Q12NB-C	In Production	N/A
UWE-12/10-Q12N-C	In Production	N/A
UWE-12/10-Q12NL1-C	In Production	N/A
UWE-12/10-Q12PB-C	In Production	N/A
UWE-12/10-Q12PBH-C	Discontinued	3/31/2022
UWE-12/10-Q12P-C	In Production	N/A
UWE-24/5-Q12NB-C	Discontinued	3/31/2022
UWE-24/5-Q12N-C	Discontinued	3/31/2022
UWE-24/5-Q12NL1-C	Discontinued	3/31/2022
UWE-24/5-Q12PB-C	In Production	N/A
UWE-24/5-Q12P-C	In Production	N/A
UWE-5/24-Q12NB-C	Discontinued	3/31/2022
UWE-5/24-Q12N-C	In Production	N/A
UWE-5/24-Q12PB-C	In Production	N/A
UWE-5/24-Q12P-C	In Production	N/A

Murata Power Solutions, Inc.
129 Flanders Rd., Westborough, MA 01581 USA
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